OFFICIAL PUBLICATION OF THE PROCEEDINGS AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

APRIL 17, 1950
VOLUME 39, NO. 8

AMERICAN DYESTUFF REPORTER

DEVOTED TO TEXTILE CHEMISTRY · BLEACHING · DYEING · PRINTING · FINISHING

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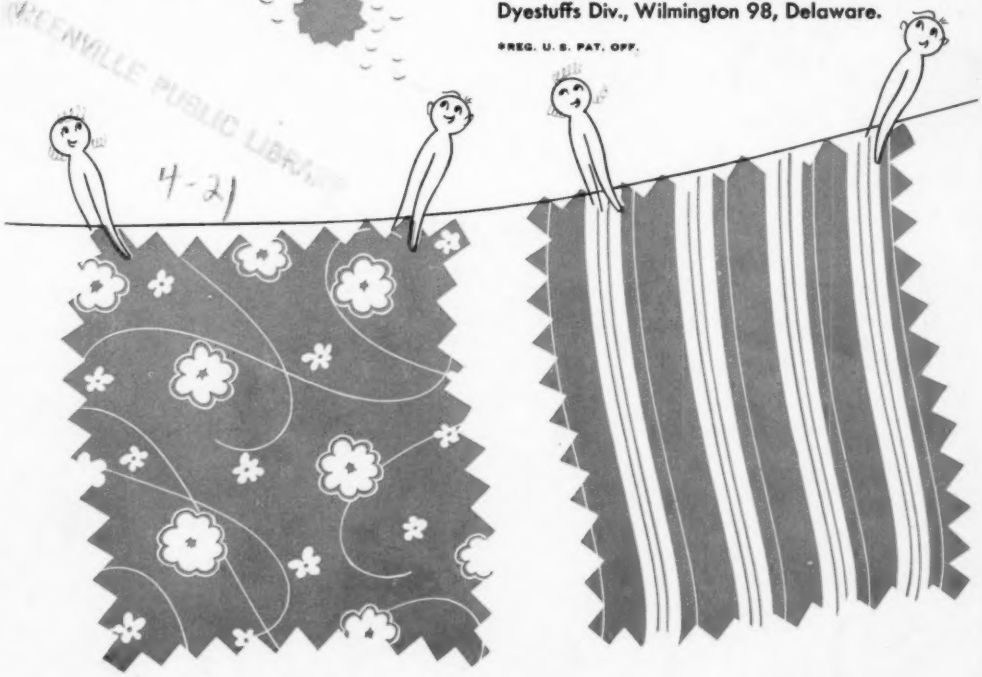
Prints that take to the sun . . .

DU PONT VAT COLOR pastes for printing cotton and rayon offer the best all-round fastness obtainable. These colors resist laundering and sunlight . . . help assure customer satisfaction.

Why not investigate Du Pont PONSOL* and LEUCOSOL* colors (anthraquinone-type dyes) and SULFANTHRENE* colors (thioindigoid-type dyes). Our Technical Staff will be glad to work with you. E. I. du Pont de Nemours & Co. (Inc.), Dyestuffs Div., Wilmington 98, Delaware.

*REG. U. S. PAT. OFF.



Always dye with an eye to the end use

Du Pont Dyestuffs

DU PONT
REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

today your customers demand top quality

"Pretty good" is no longer GOOD ENOUGH! Today your customers and prospects demand top quality and they won't be satisfied until they get it, either from you or from a competitor. Better quality calls for better color—which calls for better dyestuffs. Althouse, the pioneer in faster dyestuffs, will make your finest fabrics finer. So take advantage of our experience, research, skill and uniform quality production more than ever, because . . .

today you should demand top quality

ALTHOUSE
Chemical Company, Inc.
READING · PA.

pace-setter in precision dye-making

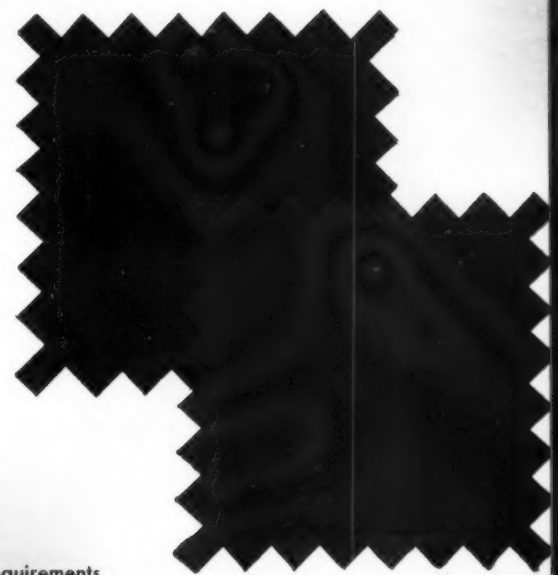
AMACEL* COLORS
answer the demand for better
color fastness in synthetic textiles

Now it can be told!!!

gas fading resistance
***PLUS* 35 to 40 hours**
light fastness and fast-
ness to perspiration.

Amacel

BLUE GLF



For months there have been whisperings about this new and versatile blue.
Now . . . after long research . . . it can be announced
as the latest addition to the popular range of AMACEL colors.

AMACEL BLUE GLF in combination with
AMACEL *Red VIX, Yellow GLF—CW—4RLF*
will enable the production of all shades of
taupes, tans, greys, greens and other mode shades, meeting all consumer requirements.

Limited quantities of AMACEL BLUE GLF are now available,
and larger production is under way to meet the anticipated demand.

For detailed information on the whole range of AMACELS available, as well as
data regarding your own particular requirements, consult our nearest branch.
A.A.P. technicians are always happy to be of service.

AMERICAN ANILINE PRODUCTS, INC.

50 Union Square, New York, N. Y. • **Plant: Lock Haven, Pa.** • **Branches:** Boston, Mass.
Providence, R. I. • Philadelphia, Pa. • Charlotte, N. C. • Chicago, Ill. • Los Angeles, Cal.
Chattanooga, Tenn. • **Dominion Anilines & Chemicals Ltd.** • Toronto, Canada • Montreal, Canada

*Reg. U. S. Pat. Off.

When the Chemist turned Salesman

"LOOK," the new purchasing agent said, "about all these Calgon* requisitions. Calgon — Calgon — Calgon — how come nothing else will do?"

The chemist moved his beaker from the Bunsen burner. "How come?"

"Yes, take cost alone . . . "

"Cost *alone?* Didn't you tell me Monday week that you purchasing agents rate quality and service ahead of cost?"

"THAT'S RIGHT. Is Calgon quality stuff?"

"Yessir." The chemist brandished his beaker tongs for emphasis. "With Calgon we *know* every single batch is up to standard and fully effective."

"BUT A SMART CHEMIST like you certainly doesn't need any service."

"I WOULDN'T rightly say that, mister. We know this business pretty near inside out, but I've seen us get stumped by some bug in our process—and get set straight by the Calgon chemists. They pioneered the new look in phosphates and they still teach us *plenty."*

The new purchasing agent interrupted, "Seems like Calgon's service is actually worth money to us?"

THE CHEMIST SAID, "It sure is . . . in more ways than one."

THE NEW PURCHASING AGENT smiled. "Thanks. I just wanted to get things straight right from the start. I figured that's how you'd feel . . . so I went ahead and ordered Calgon as usual."

*T.M. Reg. U.S. Pat. Off.

HAGAN HALL BUROMIN CALGON

calgon, inc.

A SUBSIDIARY OF HAGAN CORPORATION

HAGAN BUILDING PITTSBURGH 30, PA.

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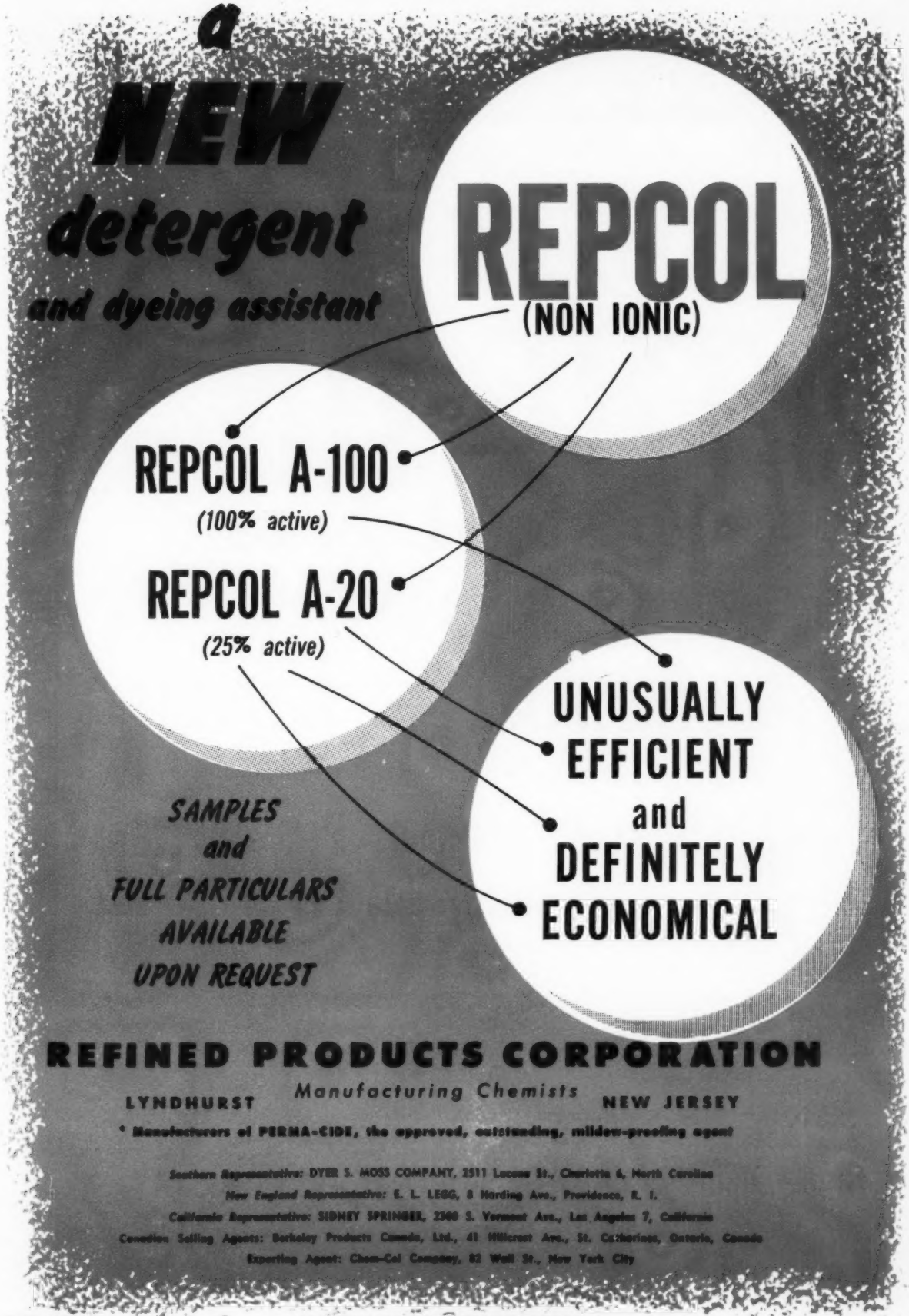
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NEW
detergent
and dyeing assistant
REPCOL
(NON IONIC)
REPCOL A-100
(100% active)
REPCOL A-20
(25% active)
UNUSUALLY
EFFICIENT
and
DEFINITELY
ECONOMICAL
SAMPLES
and
FULL PARTICULARS
AVAILABLE
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LYNDHURST Manufacturing Chemists NEW JERSEY
* Manufacturers of PERMA-CIDE, the approved, outstanding, mildew-proofing agent
Southern Representative: DYER S. MOSS COMPANY, 2511 Lucena St., Charlotte 6, North Carolina
New England Representative: E. L. LEGG, 8 Harding Ave., Providence, R. I.
California Representative: SIDNEY SPRINGER, 2360 S. Vermont Ave., Los Angeles 7, California
Canadian Selling Agents: Berkeley Products Canada, Ltd., 41 Hillcrest Ave., St. Catharines, Ontario, Canada
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THE ONE

Worsted Lubricant That ELIMINATES STATIC

Application: Top or Pin Drafter

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EVOLVED THRU RESEARCH

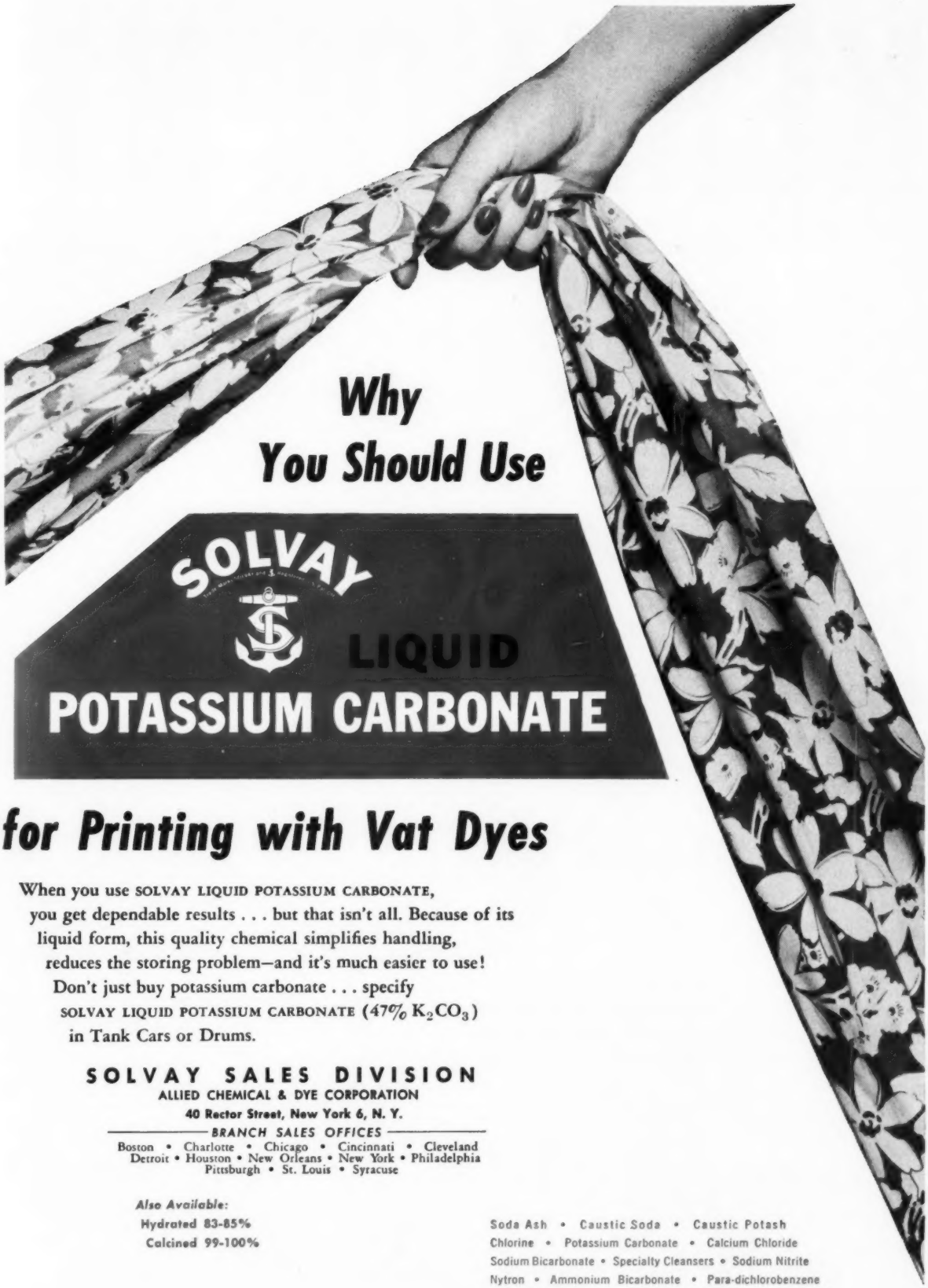
NOPCO CHEMICAL COMPANY

Formerly National Oil Products Company

HARRISON, NEW JERSEY

Branches: Boston • Chicago • Cedartown, Ga. • Richmond, Calif.

*T. M. Reg. U. S. Pat. Off.



Why You Should Use

SOLVAY LIQUID POTASSIUM CARBONATE

for Printing with Vat Dyes

When you use SOLVAY LIQUID POTASSIUM CARBONATE, you get dependable results . . . but that isn't all. Because of its liquid form, this quality chemical simplifies handling, reduces the storing problem—and it's much easier to use! Don't just buy potassium carbonate . . . specify SOLVAY LIQUID POTASSIUM CARBONATE (47% K_2CO_3) in Tank Cars or Drums.

SOLVAY SALES DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

BRANCH SALES OFFICES

Boston • Charlotte • Chicago • Cincinnati • Cleveland
Detroit • Houston • New Orleans • New York • Philadelphia
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Also Available:
Hydrated 83-85%
Calcined 99-100%

Soda Ash • Caustic Soda • Caustic Potash
Chlorine • Potassium Carbonate • Calcium Chloride
Sodium Bicarbonate • Specialty Cleansers • Sodium Nitrite
Nytron • Ammonium Bicarbonate • Para-dichlorobenzene
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Ammonium Chloride • Formaldehyde

KERANOL NK

gives **COTTONS AND RAYONS**

a very **DESIRABLE, SOFT, FULL HAND**

durable to **WASHING AND DRY-CLEANING**

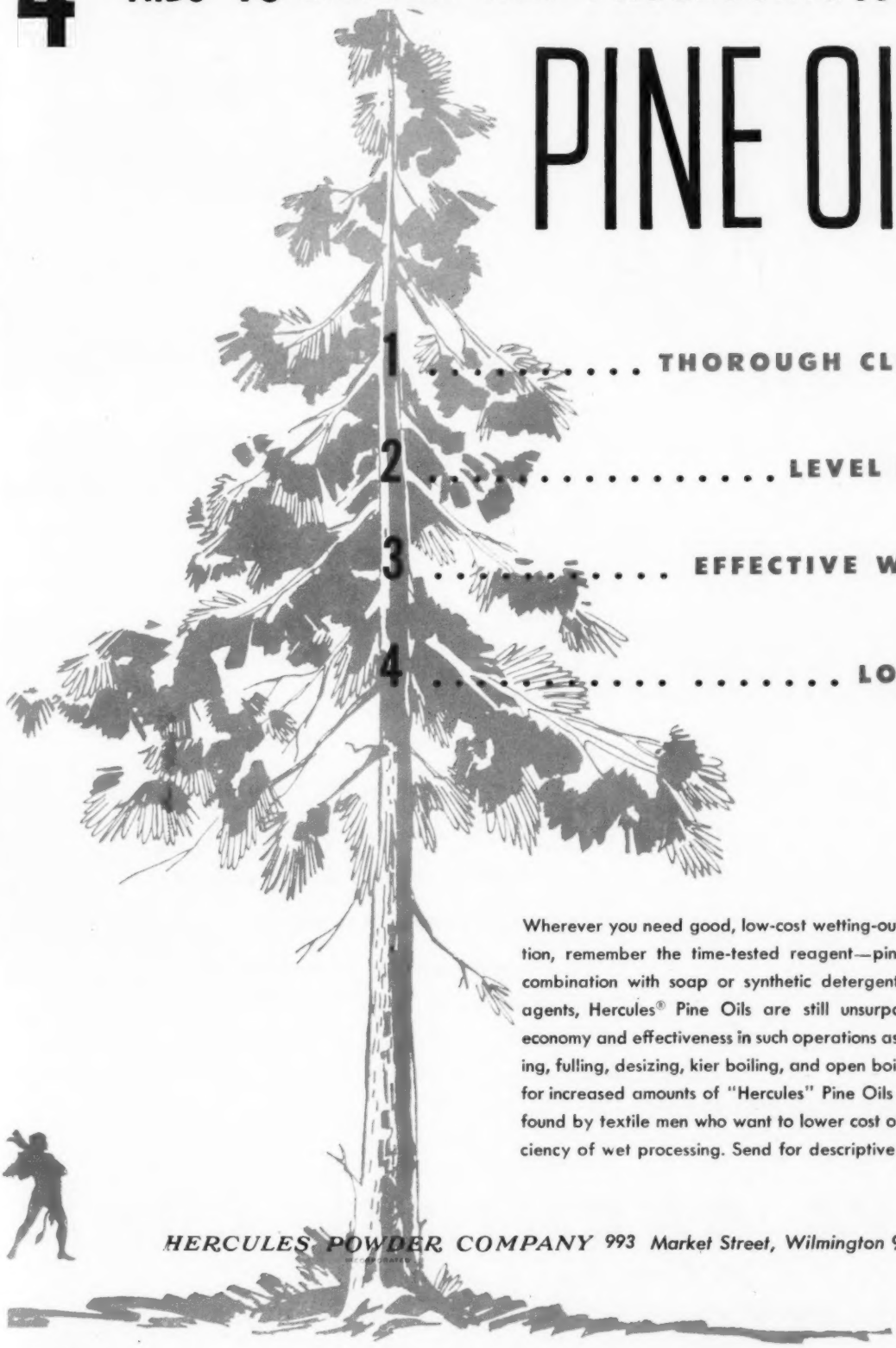
Unaffected by pH variations in the finishing bath—compatible with Resins—very resistant to yellowing, even at excessively high temperatures. Write for our technical service bulletin #208-110.1

IT'S AN Arkansas PRODUCT!

CO., INC.

NEWARK, NEW JERSEY

4 AIDS TO BETTER WET PROCESSING...WITH PINE OIL



1 ..... THOROUGH CLEANING

2 ..... LEVEL DYEING

3 ..... EFFECTIVE WETTING

4 ..... LOW COST

Wherever you need good, low-cost wetting-out and penetration, remember the time-tested reagent—pine oil. Used in combination with soap or synthetic detergents and wetting agents, Hercules® Pine Oils are still unsurpassed for their economy and effectiveness in such operations as scouring, dyeing, fulling, desizing, kier boiling, and open boil-off. New uses for increased amounts of "Hercules" Pine Oils continue to be found by textile men who want to lower cost or increase efficiency of wet processing. Send for descriptive folder.

HERCULES POWDER COMPANY 993 *Market Street, Wilmington 99, Delaware*

NY50-1

and in particular...

NOVAGEN* VIOLET B DBL SOL.

NOVAGEN* VIOLET RB DBL SOL.

Azoic printing colors for cotton and rayon producing bright blue and reddish tones of violet as self shades and all intermediate shades in combination with each other.

Selling agents for

METRO DYESTUFF CORPORATION

Plant: West Warwick, Rhode Island

* Trade Mark Registered

NOVA CHEMICAL CORP.

153 Waverly Place, New York 14, N. Y.

Warehouses in New York, Charlotte, N. C. and Greenville, S. C.

Cotton and the ULTRAWETS

From raw cotton to finished fabric . . . much of the processing involved can be improved by using the ULTRAWETS—a family of alkyl aryl sulfonates tailor-made for particular jobs. For example:

In soaping off after dyeing and printing: Liquid ULTRAWET 35KX is the most economical alkyl aryl sulfonate for volume use. Flake ULTRAWET K or bead ULTRAWET SK where dried products are desired.

In dyeing and printing: The liquids ULTRAWET 30E and ULTRAWET 30DS are particularly efficient as dye leveling and penetrating agents.

In kier boiling: Liquid ULTRAWET 35KX has excellent penetrating, emulsifying and detergent properties to help remove the natural waxes, pectin and soil from the cotton.

Cotton is just one of the textile fibers with which the ULTRAWETS are being used. They are equally important in the processing of wool and synthetic fibers. We will be glad to send you a brochure which will give you facts about the whole ULTRAWET family—liquids, flakes and beads. The Atlantic Refining Company, Chemical Products Section, 260 S. Broad St., Philadelphia 1, Pa.

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Philadelphia • Pittsburgh • Providence
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In Canada
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Division of Dominion Rubber Co., Ltd., Canada
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Wool Oil Efficiency?

Put this question to a group of textile men and you'll get a variety of answers.

What is →

Easy scouring

Stable emulsions

Good lubricating properties

Static-free

Easy to apply

But they'll all agree on one essential—***the oil must undergo no change in storage.*** It must not heat up, develop unpleasant odors, or discolor. And it must scour easily, regardless of the storage period.

That's something you can bank on when your mill starts using Proxol!

PROCTER & GAMBLE PROXOL MADE IN U.S.A.

• *made by the makers of Olate the industry's leading all-purpose textile soap...*

Proxol undergoes no change when it's on your raw wool, yarn or fabric. It won't heat up in storage. You won't have to worry about odor or discoloration. And Proxol scours out easily.

You'll discover plenty of additional advantages when you start using Proxol. Why not start now?

Procter & Gamble CINCINNATI, OHIO

sulphur colors

in sulphur colors, the first and foremost brand names are

KATIGEN
IMMEDIAL
INDOCARBON

PRODUCTS OF THE GENERAL DYESTUFF CORPORATION

if your problem concerns sulphur colors a consultation with General Dyestuff Corporation may prove very beneficial

GENERAL DYESTUFF CORPORATION
435 HUDSON STREET, NEW YORK 14, N. Y.

for plain or dischargeable dyeing of acetate and rayon

WHEN competition is keen and every nickel spent for a red acetate dye has to provide 6¢ worth of color value, call for

EASTONE RED R

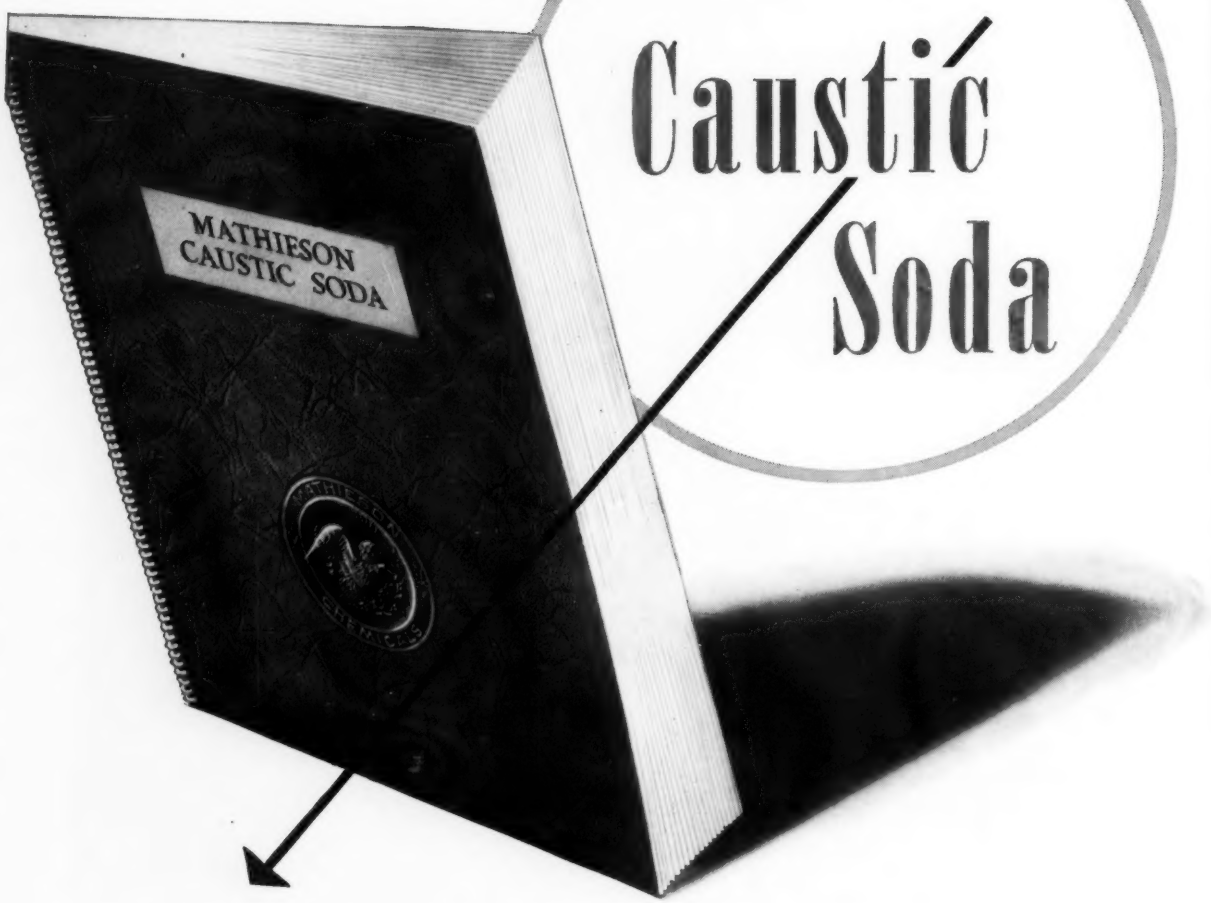
Low in cost, with level dyeing characteristics over a wide range of temperatures, Eastone Red R has an important place in every drug room. It has excellent fastness to sublimation, and, in the form of Eastone Red R (Concentrated), is highly recommended for application printing and package dyeing.

If you are not already using Eastone Red R, we will be pleased to send you detailed information and sample quantities of this bright cherry red dye for your evaluation—Tennessee Eastman Corporation (Subsidiary of Eastman Kodak Company), Kingsport, Tennessee.

Eastman Acetate Dyestuffs are sold in the United States through Tennessee Eastman Corporation in Kingsport, Tennessee, and Lodi, New Jersey; in Canada, through Clough Dyestuff Company Ltd., 33 St. Mathieu Street, St. Laurent, Quebec.

Eastman Acetate Dyestuffs

for users of Caustic Soda



• This completely new 48-page book entitled "Mathieson Caustic Soda" is now available to users throughout industry. Fully illustrated, it covers in detail the manufacture, economics, properties, handling and sampling of this product.

In 1923, Mathieson was the first to make regular shipments of caustic soda in liquid form. Today, because of the expanded productive capacities of its three large plants at Saltville, Va., Lake Charles, La., and Niagara Falls, N. Y., Mathieson is recognized as one of the leading suppliers of liquid caustic soda.

Users will find this new detailed book helpful in connection with the handling and application of caustic soda. Write for your copy today. Mathieson Chemical Corporation, Mathieson Building, Baltimore 3, Maryland.

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CHEMICALS

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SERVING INDUSTRY, AGRICULTURE AND PUBLIC HEALTH

STANDAFINS

for finishing

- A full range of body, hand and drape for all fabrics.
- Resistant to laundering and dry cleaning.
- Easy to apply on conventional equipment; no curing required.
- Compatible in bath with other finishing materials.
- Impart slip proofing and snag resistance to woven and knitted goods.
- Binders for pigments and fillers.

STANDAFIN 77
Soft, full hand

STANDAFIN R-10
Firm, full hand

STANDAFIN 1220
Stiff finish

We welcome your inquiries on these and other Standafins.
Write or call today.

STANDARD CHEMICAL PRODUCTS, INC.
13th and Jefferson Streets • Hoboken, N. J.
Chattanooga, Tenn. • Paterson, N. J. • Providence, R. I. • Sunbury, Pa.
Sacramento, Cal. • Greensboro, N. C. • Leaksville, N. C.

WILL YOUR NAME APPEAR IN THE ADVERTISING INDEX OF THE 1950 TECHNICAL MANUAL and YEAR BOOK OF THE AMERICAN ASSOCIATION OF TEXTILE CHEMISTS and COLORISTS?

Note: The following companies used advertising space in the 1949 volume:

A

Aktivin Division, Heyden Chem. Corp.
Alco Oil & Chemical Corp.
Althouse Chemical Co., Inc.
Amalgamated Chemical Corp.
American Aniline Products, Inc.
American Cyanamid Co. (Ind. Chem. Div.)
American Polymer Corp.
Analyte Instruments, Inc.
Aniline Color & Chem. Corp.
Arabol Mfg. Co., The
Arkansas Co., Inc.
Arnold, Hoffman & Co., Inc.
Asiatic Export Co., Inc.
Atlantic Chemical Co., Inc.
Atlantic Chemical Corp.
Atlas Color & Chemical Co.
Atlas Electric Devices Co.
Augusta Chemical Co.

B

Barnes Printing Co., Inc.
Barnes Textile Associates, Inc.
Bernard Color & Chem. Corp.
Bick & Co., Inc.
B. L. H. Dyestuff Co.
Brit. Amer. & East. Co., Inc.
Brook Chemical Co.
Bryant Chemical Corp.
Butterworth & Sons Co., H. W.

C

Calco Chemical Div., American Cyanamid Co.
Calgon, Inc.
Campbell & Co., Inc., John
Carbic Color & Chem. Co., Inc.
Carbide & Carbon Chem. Corp.
Celanese Corp. of America
Chem-Col Company, Inc.
Chemicolloid Labs., Inc.
Ciba Co., Inc.
Clarion Chemical Corp.
Colloids, Inc.
Commonwealth Col. & Chem. Co.
Continental Chem. Co.

D

Darpro Chemical Corp.
De Paul Chemical Co., Inc.
Dexter Chemical Corp.
Drew & Co., Inc., E. F.
Du Pont de Nemours & Co., (Inc.), E. I. Dyestuffs Division
Dye Specialties Corp., Inc.

E

Emery Industries, Inc.

F

Fabric Chemicals Co.
Fallek Products Co., Inc.
Feeley Co., E. J.
Filo Color & Chem. Corp.
Fletcher Works

G

Gaston County Dye Mach. Co.
Geigy Co., Inc.
General Chemical Div., Allied Chemical & Dye Corp.
General Dyestuff Corporation
Grady Company, Robert B.
Gross & Co., A.

H

Harrison & Co., Inc.
Hart Products Corp.
Houghton & Co., E. F.
Hunter Machine Co., James

I

Industrial Dyestuff Co.
Interchem. Corp., Textile Colors Div.
Inter. Chem. & Dye Mfg. Co., Inc.

J

Jenkins Peuchot Color & Chemical Co.
Jersey Manufacturing, Inc.

K

Kali Manufacturing Co.
Klauder Weldon Giles Mach. Co.

L

Laurel Soap Mfg. Co., Inc.
Leatex Chemical Co.
Lowell Textile Institute, The

M

Mann & Co., Inc., George
Marathon Corporation
May, Inc., Otto B.
Maywood Chemical Works
Monsanto Chemical Co.
Mutual Chemical Co. of Amer.

N

National Aniline Div., Allied Chemical & Dye Corp.
Niacet Chemicals Div., U. S. Vanadium Corp.
Nopco Chemical Co.
Nova Chemical Corp.
Nyanza Color & Chem. Co., Inc.

O

Onyx Oil & Chem. Co.
Orleans Co., Inc.

P

Pabst Sales Co.
Peerless Color Co., Inc.
Pfister Chemical Works, Inc.
Pfizer & Co., Inc., Chas.
Pioneer Chemical Works, Inc.
Procter & Gamble
Proctor & Schwartz, Inc.

R

Refined Products Corp.
Richmond Oil Soap & Chem. Co., Inc.
Rodney Hunt Machine Co.
Rohm & Haas Co.
Rosentwist & Gorner
Royce Chemical Co.
Ruger Textile Color Co.
Rumford Chemical Works
Rutherford Dye & Chemical Co., Inc.

S

Sagamore Color & Chem. Co.
Sandoz Chem. Works, Inc.
Scholler Bros., Inc.
Scott Testers, Inc.
Sharples Chemicals, Inc.
Sindar Corporation
Smith, Drum & Co.
Solvay Sales Div., Allied Chemical & Dye Corp.
Somerset Color & Chem. Co., Inc.
Sonneborn Sons, Inc., L.
South Florida Test Service
Standard Brands, Inc.
Standard Chem. Prods., Inc.
Surpass Chemical Co., Inc.
Sylvania Div., American Visc. Corp.
Synthetic Chemicals, Inc.

T

Tennessee Eastman Corp.
Test Fabrics Co.
Tex-Chem Co.
Thomas Co., Arthur H.
Titan Chemical Products, Inc.

U

United Chem. Products Corp.
United Piece Dye Works, The
United States Dyestuff Corp.
U. S. Testing Co., Inc.

V

Van Vlaanderen Machine Co.
Venango Engineering

W

Wallerstein Co., Inc.
Waterway Projects Inc.
Warwick Chemical Div., Sun Chemical Corp.
Wolf & Co., Jacques
Woonsocket Color & Chem. Co.

Y

Young Aniline Works, Inc.

Z

Zinsser & Co., Inc.
Zurn Co., O. F.

●

THE ADVERTISING FORMS FOR THE 1950 VOLUME WILL CLOSE MAY 1st

●

WE SUGGEST THAT YOU RESERVE YOUR ADVERTISING SPACE IMMEDIATELY

●

A FULL PAGE ADVERTISEMENT COSTS ONLY $200.00

Send your reservation to

HOWES PUBLISHING CO.
One Madison Avenue
New York City (10), N. Y.

Telephone:
MU. 5-0375

Vat Paste Preparation is

Child's play!

— **With AMBERTEX M,** National's liquid starch concentrate! You simply blend this ready-to-use thickener with chemicals and water

And in 30 minutes your paste is ready! In fact, it's so simple you no longer need cooking apparatus — cooling coils — storage tanks — steam — or 4 to 5 hours preparation time!

AMBERTEX pastes are *pre-controlled* for viscosity and stability. They deliver higher color yields. Especially effective with rapidogen, vat and white discharge colors. Smooth, uniform blotches. Soft pliable films that protect delicate fabrics — rinse out in a jiffy!

Address: 270 Madison Ave., NEW YORK 16; 3641 So. Washtenaw Ave., CHICAGO 32; 735 Battery St., SAN FRANCISCO 11, and other principal cities. In CANADA: National Adhesives (Canada) Ltd., TORONTO and MONTREAL. In ENGLAND: National Adhesives Ltd., SLOUGH.

National
STARCH PRODUCTS

We'd like to test these NATIONAL Textile Specialties and Starches:

- ☐ Please send test samples
- ☐ Have a representative call
- ☐ AMBERTEX M (described above)
- ☐ FIBERJEL V for filament viscose sizing
- ☐ FLOTEX to replace natural printing gums
- ☐ TABLE ADHESIVE for screen printing
- ☐ FLOCK ADHESIVE 970 for chenille printing
- ☐ FARILON for Rapidogen printing and backfilling
- ☐ CLEARFILM for bright, lustrous finishes on cotton and rayons
- ☐ VAT THICKENER 36 for rayon and cotton

Mr._____

Company_____

Address_____

City_____ Zone____ State_____

Are you getting the MOST from the wool you buy?

You'll cut spinning costs by increasing yarn strength with SYTON

Now, with wool prices climbing, it's more important than ever to *save* when you spin. Ample reason to look into the ways many woolen and worsted mills are cutting costs with Syton.

Syton builds yarn strength from 10%-to-30%. In many mills that means less lap waste and fly, and fewer ends down during spinning and weaving. You know, even better than we, what fewer ends down can mean in production time saved, and expensive labor time saved . . . in *your* mill.

Here are a few of the ways Syton makes operating economies in woolen spinning. Similar savings are made by worsted spinners, carpet makers and commission spinners.

Easier Carding:

Syton means better parallelization of the fibers. Fibers are more uniform and controlled so that cards may be speeded, often with reduced fly and waste.

Stronger Ropings:

Because ropings are stronger, there are fewer ends down at the condenser and at the unwinding of the jackspools.

Faster Spinning:

Syton controls fiber slippage during elongation or draft. This permits faster machine speed. Better fiber control during spinning increases tensile strength and permits twist to be reduced.

Finer Counts:

Finer counts can be spun on all grades of stock, including lower grades which are becoming more and more important as wool prices rise.

Improved Dressing, Weaving, Finishing:

Greater yarn strength helps warp dressing and increases weaving efficiency. The woven fabric fulls more evenly.

Syton is a silica dispersion created and developed by Monsanto research and successfully put to *work* by the mills. Based on figures of the U. S. Census Bureau, 38.6% of all the woolen and worsteds spun in the United States in 1949 were spun with Syton.

Syton can mean savings in your mill, too. So start saving as soon as you can. We're ready to give you full details on Syton as applied to your mill. Send the handy coupon today.

FREE BOOKLETS, TECHNICAL HELP

Send today for free booklets, or for technical help with Syton right at your own plant. Please use the coupon on the opposite page.

THE WALL STREET JOURNAL,
Thursday, January 26, 1950

Suit o' Clothes

Soaring Wool Prices Kick Costs Upward for Suit and Pants Makers

May Mean Higher Prices on Fine Apparel, Wider Use Of Lower Grade Wools

World Fleece Supplies Fall

Just four months ago a pound of fine Australian fleece could be bought in Boston for $1.40. By early last week it had climbed to $1.85. It's now flirting with the $2 level. A Bostonian who has spent his life studying wool thinks "it could easily go to $2.25."

Manufacturers, generally, are afraid to push up prices much; they fear a balky public will trim its clothing purchases. So the switching to a higher percentage of lower grade wool may come pretty heavily into the picture, wool experts believe.

Now...from Monsanto

UREA RESIN

the new Santaloom

Another addition to Monsanto's complete line of textile resins!

Monsanto adds urea to its long list of resins already serving the textile industry. Now, more than ever, Monsanto can serve you as headquarters for textile chemicals and, specifically, textile *resins.*

Rayon finishers using Santaloom will get *durable freshness and wrinkle-resistance, long-lasting shrinkage control genuine fabric stability!* They'll get the outstanding service and technical assistance that the buyers of Monsanto's melamine resin, Resloom, have been getting.

Your Monsanto salesman is ready to serve you with quick, reliable shipments of the new Santaloom. For information on Santaloom . . . shipments, prices, technical data . . . please send the handy coupon today.

Santaloom, Syton, Resloom: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS AND PLASTICS

SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO CHEMICAL COMPANY, Textile Chemicals Dept.
Everett Station, Boston 49, Mass., Desk ADT 31

Please send me:

☐ Full price, shipment and technical information on Santaloom.

☐ Syton booklet for: ☐ Woolen spinners ☐ Worsted spinners ☐ Carpet makers ☐ Commission spinners

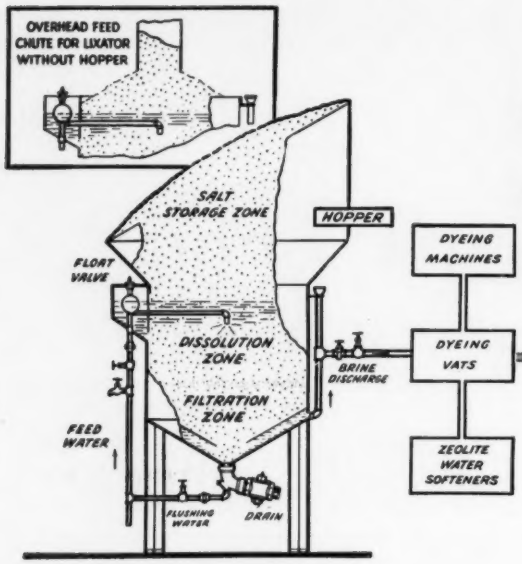
Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

The LIXATE pipe line to efficient brine distribution



HOW THE LIXATOR WORKS

In the dissolution zone—Flowing through a bed of Sterling Rock Salt which is continuously replenished by gravity feed, water dissolves salt to form 100% saturated brine. In the filtration zone—through the use of the self-filtration principle originated by International, the saturated brine is thoroughly filtered through a bed of undissolved rock salt. The rock salt itself filters the brine. Nothing else is needed.

THE LIXATOR *automatically* provides 100% saturated crystal-clear, self-filtered brine that can be piped, by gravity or pump, anywhere . . . at any distance . . . it is needed in your plant.

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THE LIXATE PROCESS for Making Brine cuts production costs as high as 20% . . . by cutting labor, time and waste in making brine. No hauling, measuring, stirring . . . YET ALWAYS a continuous supply of *accurately measured* brine.

Consult our Technical Service Department on your use of salt and brine. The experienced men on this staff will advise you on the proper location for Lixator and salt storage, pumping arrangements, types of pumps, meters, and valves. They will fit the *money-saving* Lixator into your plant operations. Write today!

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Newsworthy onyx Chemicals

FOR TEXTILE PROCESSING

Previously Mentioned...

Water-Soluble Resin Finish

Xyno Resin R is a non-curing finish providing a wide range of interesting hands on synthetics—particularly on acetates. It is being used with highly satisfactory results on foulards, taffetas, tie fabrics and jacquards. On acetate ribbons its stiff, lustrous finish is greatly appreciated.

Xyno Resin R is available as a 50% active aqueous solution, used conventionally without process changes. It will not cause mark-off or dull effects.

Low Cost Wetting Agent

Sorolene* G is a speedy wetting agent with excellent dispersing action and moderate foaming properties. Sold in paste form, Sorolene* G is the sodium salt of an alkyl naphthalene sulfonic acid. Already in extensive use for pasting-up dyes and for levelling and penetrating action in dye baths, it also makes an unusually effective, economical assistant in scouring and in boiling out cotton goods. Has good stability to fairly concentrated acid and alkaline solutions.

Economical Non-Ionic Emulsifying Agent

Estramine is a fatty acid alkanolamine condensate in liquid form, containing 95% active material. It is applicable to any textile processing operation where effective emulsifying and detergent action is required, particularly where compatibility with anionic or cationic materials is essential. Its low use-cost makes it of interest as a substitute for soap, notably in the scouring and fulling of wool and worsted. It is also most valuable in dispersing heavy dye solutions. Estramine leaves fabrics in an unusually soft, porous and receptive condition for subsequent finishing operations.

Occonaze LH—Dual Purpose Enzyme for Rapid Desizing of Cotton, Cellulosic and Mixed Goods

Occonaze LH is a proteolytic *and* amylotic enzyme offering the highest degree of heat stability in solution. Because it can be used at high bath temperatures to get faster action, Occonaze LH is particularly well adapted to continuous desizing.

On either batch or continuous operations, desizing with Occonaze LH follows the usual procedure of saturating the cloth, followed by a digestion period during which the starches and/or proteins are solubilized. You stock one desizing material, since Occonaze LH is both proteolytic and amylotic.

When you use this new desizing enzyme, you will get no streaking or blemishes. Supplied in powder form, it is much less bulky than liquid compounds—requiring less storage space. It is stable in storage, unlike liquid enzyme products.

Onyx Technical Data Sheet No. 22-T covers the characteristics and uses of Occonaze LH. Write for a copy.

Salient Data on Occonaze LH

Constitution . . . Biological material in a buffered, stabilized formula. Physical State . . . Powder: 100% through 60 and 95% through 80 mesh. Compatibility . . . Hard water—compatible. Acids and alkalies—incompatible. Stability . . . Powder: indefinitely stable in storage at room temperature. Solutions: highly stable to heat. Solubility . . . Active ingredients are completely soluble in water.

DULLATONE* DG . . . The Most Satisfactory Duller Ever Produced for Dark Shades

With the successful development of this new and superior duller for dark shades, Onyx rounds out its lines of dullers for all types of rayon, acetate and nylon piece goods. Dullatone CA long ago established itself as the outstanding duller for light shades, producing dull, soft tones without imparting a harsh hand. Now the same effective treatment is available for dark shades. Can be run for long periods without build-up on rolls or streaking.

XYNOFIX FL . . . Your Guarantee Against Bleeding Prints and Against Dye Migration Where Drying is Delayed

When you use Xynofix FL in the final print wash you will have no trouble with bleeding—even on colors that have been bad offenders in the past. Xynofix FL in the final rinse after dyeing prevents migration of dyes wherever dyed goods have to be held over in trucks due to delayed drying schedules.

You can easily satisfy yourself as to the complete dependability of Xynofix FL, because a test run is readily and quickly made. Get in touch with us if you are interested in such a test.

Xynofix FL is covered in Onyx Technical Data Sheet No. 23-T.

NEUFUME DMH . . . for Protection Against Gas Fading which Resists Dry Cleaning and Laundering

Neufume DMH has been thoroughly tested and proved in the field, and is already in wide use as a durable preventative of gas fading. It is added directly to the bath with the dyestuff, and does not cause any increase in dyeing time. Neufume NS can be used where durability of protection is not essential. It is used in the finish bath to give a high order of resistance to gas fading, which, however, is non-durable.

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Sodium sulfide (Fe 8 ppm Max.), Sodium Sulfhydrate (Fe 5 ppm Max.), and Sodium Tetrasulfide (other Sodium Salts, 1.0% Max.) exemplify the care Hooker uses in the preparation of these products. This quality enables you to turn out uniformly excellent products at no increase in cost. There is added saving due to the fact that the clean solution of sulfide and sulfhydrate can be used without settling or decanting—a worthwhile time saver—Purity Pays Dividends.

UNIFORM QUALITY

Dependably uniform quality cuts processing costs several ways. It is not necessary to keep a constant check on solution strength. Finished quality is uniform.

Variation in impurities can slow processing time and cause wide variations in quality and may even lead to possible rejection of the finished product. You get more than you pay for when you buy quality.

PROMPT SHIPMENT

Hooker's popularity as a source of sulfides is due in good measure to its painstaking efforts to meet the processing requirements of its customers. Prompt shipment from ample stocks keep customer's inventory requirements to a minimum.

Particular attention is paid to cleanliness of shipping containers to insure that no impurities mar the quality of the finished product.

Your first step to sulfide satisfaction is to write for samples and data sheets. Please make your request on your company letterhead.

SODIUM SULFIDE Na_2S

Mol. Wt. 78.1
M. P. . . . . 100°C

Light buff colored solid in flake form. Rapidly soluble in water; slightly soluble in alcohol; insoluble in ether. Also available in solid form.

ANALYSIS

Na_2S . . . . . 60 to 62%
NaCl . . . . . 1.5% Max.
Other Na Salts . . . . . 2.0% Max.
Fe . . . . . 8 ppm Max.
Cu, Ni, Cr, Mn, Pb . . . . . 1 ppm Max.
Water of crystallization . . . . 35% Min.

USES

In manufacture of dyestuffs, chemical intermediates, paper pulp, soap and rubber, as an ingredient of dye liquor for textile dyeing; boiling out linen; ore flotation and metal refining, in unhairing hides and wool pulling; desulfurizing viscose rayon.

SHIPPING CONTAINERS

Steel drums . . . . . 90 and 350 lbs. net

SODIUM SULFHYDRATE NaSH

(sodium hydrosulfide)

Mol. Wt. 56.1
M. P. . . . . 55°C

Light lemon colored solid in flake form. Completely and rapidly soluble in water, alcohol and ether. Also available as a liquid.

ANALYSIS (*Flakes*)

NaSH . . . . . 70 to 72%
Na_2S . . . . . 2.5% Max.
NaCl . . . . . 0.8% Max.
Na_2SO_3 and $NaHCO_3$ . . . 0.4% Max.
Fe . . . . . 5 ppm Max.
Cu, Ni, Cr, Mn, Pb . . . . . 1 ppm Max.
Water of crystallization . . . 28 to 26%

USES

In preparation of dyestuffs and other organic chemicals such as thioamides, thiourea, thioglycolic acid, thio- and dithio-benzoic acids, sodium thiosulfate, in unhairing hides, in desulfurizing viscose rayon.

SHIPPING CONTAINERS

Flake: Lacquer-lined steel drums . . . . . 90, 350 lbs. net
Liquid . . . . . Tank Cars

SODIUM TETRASULFIDE Na_2S_4

(40% solution)

Mol. Wt. 174.23
Melting Range . . . 3.5 to 17°C

It is a clear dark red liquid with an odor of hydrogen sulfide.

ANALYSIS

Na_2S_4 . . . . . 40.44%
Sulfur 30.27%
Other sodium salts including sodium thiosulfate, sodium carbonate and sodium sulfate . . . . . 1.0% Max.

USES

Reducing organic nitro bodies; insecticides and fungicides; ore flotation reagent, manufacture of sulfur dyes, preparation of metal sulfide finishes, soaking of hides and skins prior to unhairing.

SHIPPING CONTAINERS

Steel drums . . 90 and 350 lbs. net and Tank Cars

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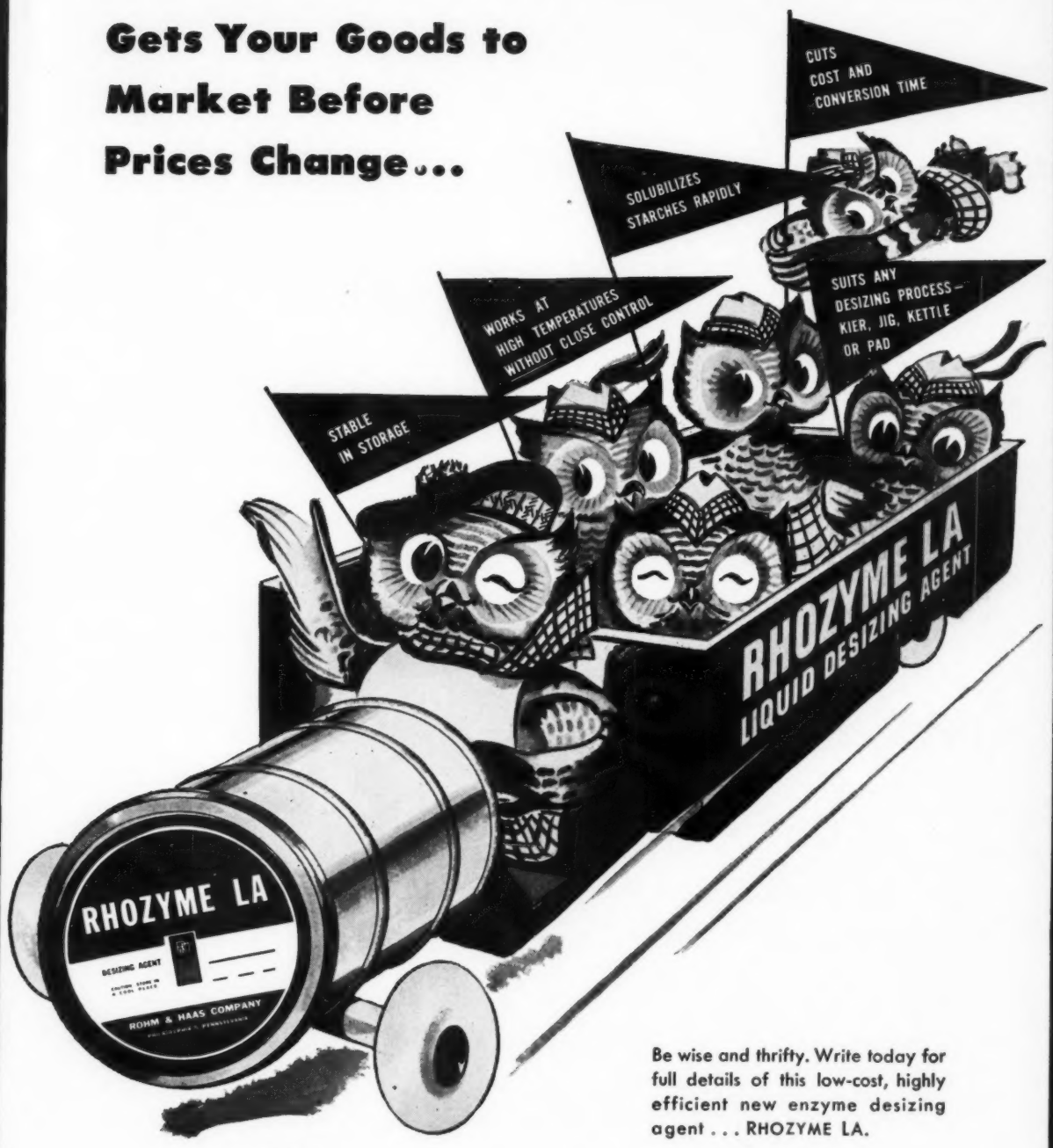

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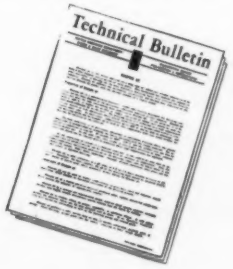

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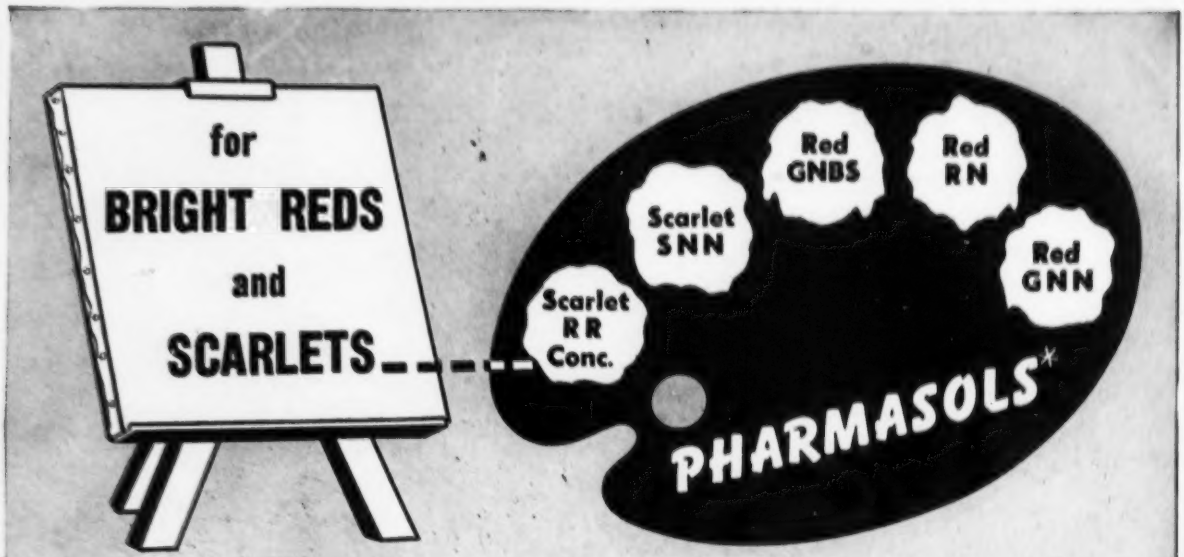

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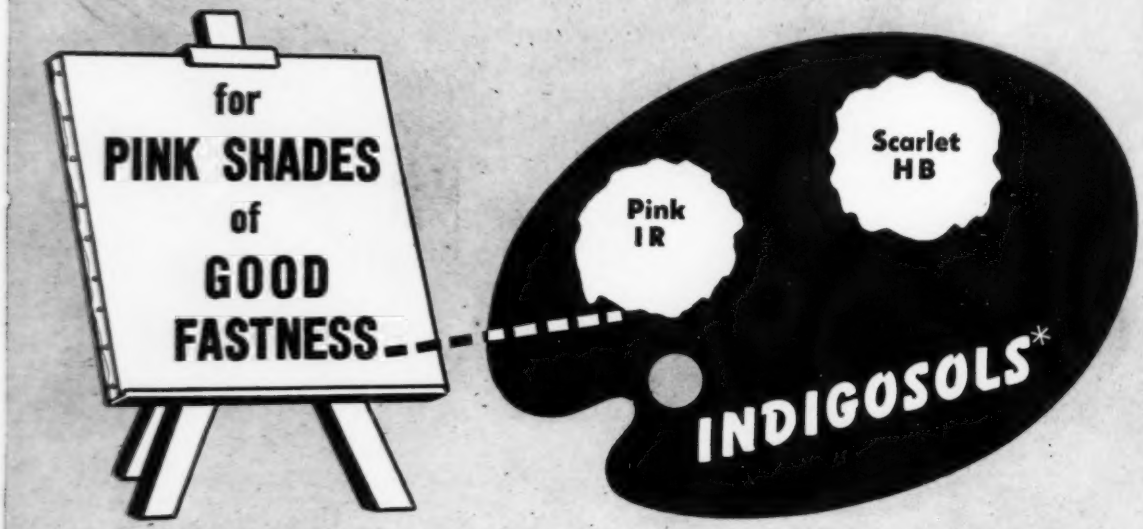

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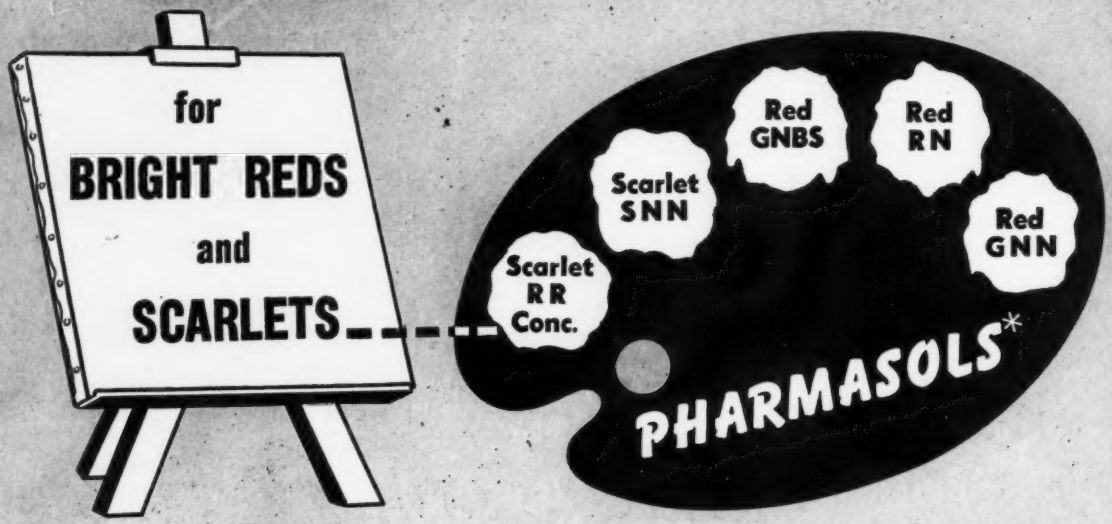

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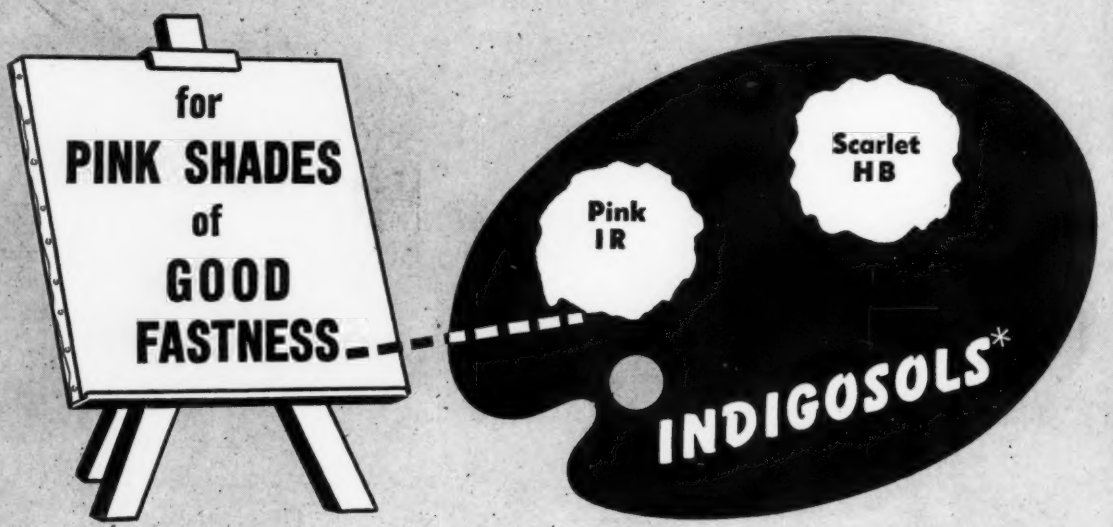

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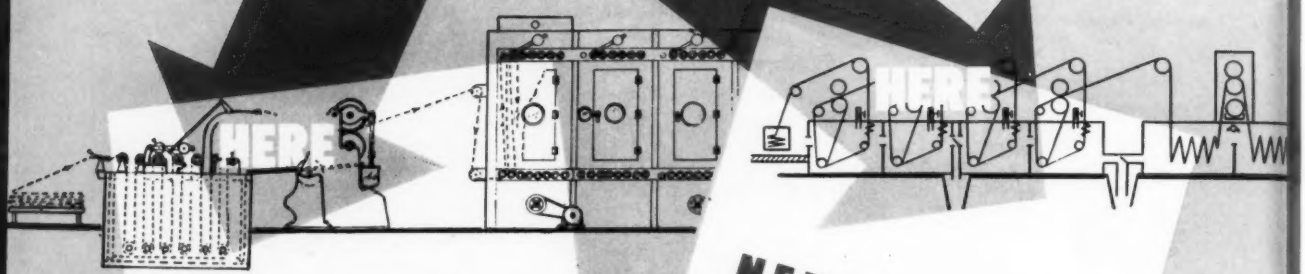

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VOLUME 39 APRIL 17, 1950 NUMBER 8

FACTORS AFFECTING THE RELAXATION SHRINKAGE OF KNIT UNDERWEAR TUBING

LOUIS I. WEINER
Textile Finishing Research Laboratory
Philadelphia Quartermaster Depot

Foreword

The studies by the Quartermaster Corps in the field of shrink resistance have up to recently dealt primarily with the felting shrinkage of wool and methods of combating felting. Within the last two years, however, these investigations have also pointed to the significance of relaxation shrinkage which is of profound importance in all types of knit goods.

In looking forward to an ultimate requirement for knitted garments with controlled shrinkage, it has been apparent that before such a step could be taken more information was needed on the actual mechanism of relaxation shrinkage as it occurs in our knitted fabrics. Accordingly studies were initiated a year ago directed toward obtaining basic data on the relaxation shrinkage of these materials.

Our office has been particularly fortunate in having the interest and continuing assistance of the Underwear Institute, and in particular that of Roy A. Cheney, President, and his Army Liaison and Research Committees, who have consistently concerned themselves with a practical approach to this problem. Similarly, we have been much interested in the studies being conducted by the Redman Trust under the sponsorship of the Underwear Institute and have looked forward to the development of appropriate mill processing machinery which would provide a practical means for dealing with this matter.

In submitting this report, we should like to express our very deep appreciation to Wesley Heilman, of the Gibbs Underwear Company in Philadelphia, who has shown a deep interest in this problem and has made available the facilities of his plant for the work which is reported upon and also to Walter Diener of the Spring City Bleach and Dye Works in Spring City, Pennsylvania, for assistance in finishing the samples.

I should like especially to commend Louis I. Weiner for the way in which this study has been approached, despite the fact that he has had other pressing problems which have had to go forward concurrently. He has been ably assisted in the work by Francis J. Spagna and Miss Gertrude Ardis.

S. J. KENNEDY
Research Director for Textiles,
Clothing and Footwear

* * * * *

Abstract

Studies were made of the effect of knitting and finishing variables on the shrinkage of typical Quartermaster Corps cotton underwear constructions. Factors analyzed such as yarn count, knitting stiffness, and stitch type reveal the importance of tightening the fabric structure as a means of reducing potential laundering shrinkage. Study of finishing factors indicate that wet operations, as currently practiced, tend to relax the fabric somewhat, thereby reducing shrinkage, but not sufficiently to overcome the major shrinkage-inducing strains introduced in knitting. Calendering is shown to have a determining effect on the shrinkage of the finished fabric and it is found that adjustments of the directional shrinkage of knit underwear may be made at this stage of processing. Through the combination of optimum knitting and finishing conditions it is found possible to reduce the potential shrinkage of underwear by as much as one-half.

Introduction

Shrinkage of knit goods may be of two types: relaxation, which is common to all knit structures regardless of the basic fibrous material; and felting, which occurs where wool is employed either as the sole fiber or in a mixture with a non-felting fiber. Whereas felting shrinkage is not reversible, a fabric which has suffered relaxation shrinkage may be subjected to wet manipulation to restore the fibers and yarns to their approximate original positions.

As is the case with woven fabrics, the relaxation shrinkage of knit fabrics may be ascribed to two general causes, release of strains and swelling. The release of strains generally occurs when the material is wetted. Swelling of the fibers (and consequently the yarns) which occurs when water is absorbed, produces forces that cause rearrangement of the yarns resulting in external shortening of the fabric *(1)*.

The experiments described in this report were conducted to determine the effect of knitting and finishing variables on the relaxation shrinkage of knit fabrics. Because of the inherent difficulties in testing the shrinkage of knit goods, it was found expedient to experiment with cotton underwear constructions rather than wool to eliminate the necessity for segregating relaxation from felting shrinkage effects. Testing technics now under development will allow for a continuation of this study for wool constructions.

Methods of Evaluating Relaxation Shrinkage

Most test data on relaxation shrinkage of knit goods are difficult to interpret because the evaluation procedures used do not allow the fabrics to reach a reproducible state of equilibrium. In some procedures excessive variation is introduced by individual operators' technics in shaping the fabrics to eliminate wrinkles; in others, tension devices are used which may distort the fabric.

In all, four methods have been used by the Quartermaster Laboratories for evalu-

* Textile Series—Report No. 57, Office of the Quartermaster General, Military Planning Division, Research and Development Branch. Released by the Office of Technical Services, U. S. Department of Commerce.

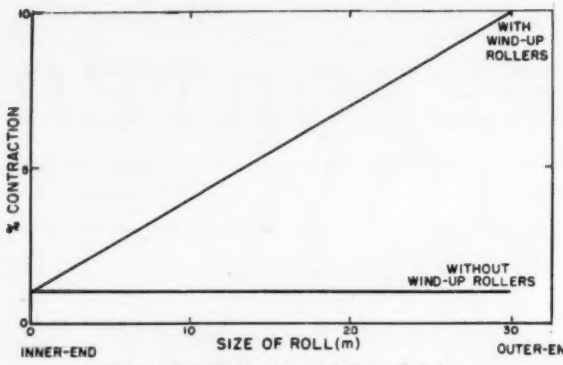

Figure 1—Contraction of Grey Fabric

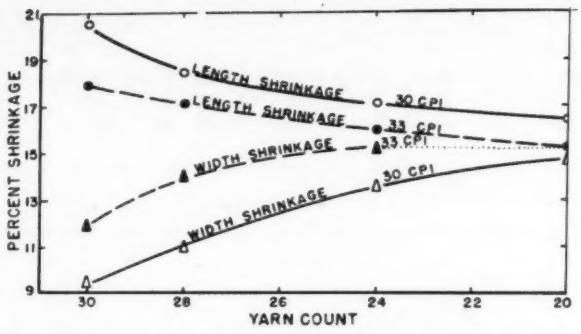

Figure 2—Effect of Yarn Count on Shrinkage in Laundering of Rib-Knit Fabric

ating the relaxation shrinkage of cotton underwear. These are:

1. Soaking of the fabric is an aqueous solution and measuring while under water. (This is the routine relaxation shrinkage test used by the British).
2. A single laundering followed by drying in an *oven.*
3. A single laundering followed by drying in a *rotary-tumbler.*
4. Successive launderings, each of which is followed by drying in a *rotary-tumbler.*

A distinct advantage of the tests involving drying in a rotary tumbler is that it reduces the amount of handling of the wet material required, allowing the fabric to reach a reproducible state of equilibrium and thus results in a marked improvement in testing precision. *(2).*

The shrinkage of a typical underwear fabric after using each of the above procedures is as in Table I.

With successive launderings (Method 4) it is found that shrinkage continues to increase at a reduced rate and eventually levels off at some constant value. It has been found that where tumbler-drying is used, more than 75 per cent of the ultimate shrinkage occurs at the end of the first wash.

In the light of this observation and also in consideration of the fact that underwear garments are dried in tumblers in all Army Laundries, it has been found both realistic and feasible to use a single laundering test followed by tumbler drying as a criterion of the relaxation shrinkage of underwear.

Experimental Procedure

The experiments described in this report were made on both rib and flat-knit fabrics. The machines used for making the flat-knit fabrics were of the Crane spring needle type. In testing the effect of yarn size and knitting stiffness, a 6-feed machine having a 17-inch diameter cylinder fitted with 40-gauge needles, 20 needles to the inch, was used. The rib fabrics were knit on Wildman machines. A 12-cut, 12-feed machine having a 17-inch diameter cylinder fitted with 36-gauge needles was used for most of the experiments.

Two series of experiments were conducted. In one, the effect of varying the yarn size, knitting stiffness, and stitch type was studied and the shrinkage evaluated in the grey fabric. In the other series most of the knitting factors were kept constant and the fabric was submitted to all of the normal finishing operations such as scouring, bleaching, drying, calendering and the resultant shrinkage of the fabric evaluated in the finished material. In this series of experiments the effect of preshrinking was also evaluated.

Considerable distortion and variation are introduced into fabrics during knitting. The following factors are known *(3)* to have a bearing on the laundering shrinkage of the fabric produced:

1. Yarn count
2. Conditions of yarn manufacture
3. Type of stitch
4. Tightness of stitch

Other factors are known to contribute to the potential shrinkage of grey fabrics and will be considered in further studies. The four listed above were taken into account in this study and are reported upon below. Before the grey fabrics were evaluated for shrinkage they were brought into dimensional equilibrium in a standard atmosphere.

It was found that the fabrics which had been wound on takeup rollers exhibited the greatest reduction in length on reaching equilibrium and that the reduction in length was greater at the outer layers of the rolls of cloth. This phenomenon has been studied in detail by Dutton *(3)* who obtained the data shown diagramatically in Figure 1, where contraction in length is plotted as a function of size of the roll of cloth.

This stretch in length is, of course, accompanied by a reduction in fabric width which may vary as much as one inch over a 20-yard length of fabric. In the series of experiments described in this report, width as well as length contractions were minimized by keeping the size of the rolls as small as possible.

Shrinkage evaluations were made by subjecting the fabrics to a single cotton laundering followed by drying in a tumbler. The exact procedure used is described in detail in the appendix to this report. Measurements were made without tension with the fabrics laid out flat on a table.

TABLE I

Effect of Testing Technic on Shrinkage of a Typical Underwear Fabric

Testing Technic	*Length Shrinkage*
Method 1 above	9.4%
Method 2 above	12.7%
Method 3 above	16.0%
Method 4 above	19.2%

Effect of Knitting Variables on Shrinkage

A. YARN COUNT—It is common knowledge that the dimensional stability of woven fabrics is related to tightness of weave; fabrics well packed with warp and filling yarns being subject to less laundering shrinkage than more open structures. Similarly, the *length* shrinkage of knit fabrics has been found to be less severe where coarser yarns, which are considered heavy for the gauge of the machine, are used. This effect is shown graphically in Figure 2. As the yarn count is decreased from 30/1 to 20/1 (i.e., as the yarn becomes larger) the resultant length shrinkage of the knit fabric decreases.

As is also shown in Figure 2, use of heavier yarns results in greater *width* shrinkages. At the heavier yarn counts (20's) length shrinkage is at a minimum, width shrinkage at a maximum, and the two are quite close numerically.

It would appear that the increased shrinkage in one direction would negate the improvement in dimensional stability

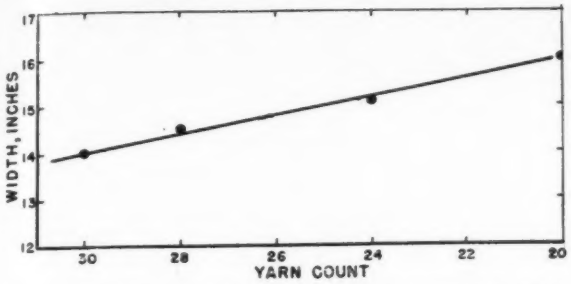

Figure 3—Effect of Yarn Count on Width of Rib-Knit Fabric (33 cpi)

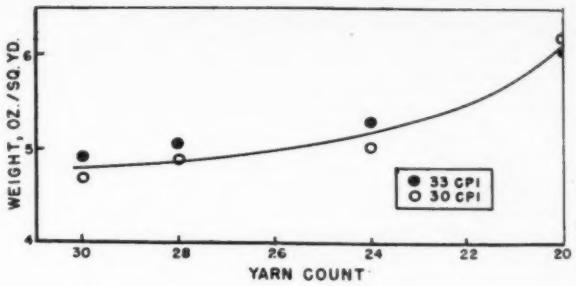

Figure 4—Effect of Yarn Count on Weight of Rib-Knit Fabric

obtained in the other. Such is not the case, however, since, as is shown later, potential width shrinkage is in all instances eliminated during subsequent wet finishing operations. In addition, it is possible during the calendering step to adjust fabric width without increasing the potential length shrinkage. Thus, as will be shown, the dimensional stability achieved through tightening the fabric structure by using heavier yarns, persists throughout the balance of the finishing process to the finished fabric.

Changes in yarn count, in addition to altering the shrinkage characteristics of knitted fabrics, also affect their width and, of course, their weight. As shown in Figure 3, fabrics knit from a 20/1 yarn may be as much as two inches wider than one knit with a 30/1 yarn. In varying the yarn count for a given gauge machine, consideration must be given to this significant factor in determining the width of the finished fabric.

Figure 4 shows the fabric weight increase effected by decreasing the yarn count.

The improved control of length shrinkage that occurs when heavier yarns are used may be explained by the closer packing of the fibers and yarns which takes place, resulting in an increase in fabric density. Because of this closer packing there will be less opportunity for consolidation of the fabric structure on laundering. It follows that improved dimensional stability would also be achieved by knitting a given yarn size in a finer gauge machine.

B. CONDITIONS OF YARN MANUFACTURE—It is recognized that factors in yarn manufacture such as twist and staple length may have a significant effect on the relaxation shrinkage of a resultant fabric. A detailed study of these factors is being conducted at the present time to determine their effect on relaxation shrinkage and also on felting shrinkage when wool yarns are used. It was felt that for most cotton yarns used in underwear the conventional methods of manufacturing and spinning would not yield appreciable differences in shrinkage behavior of the fabric, even though it is well known that knitting efficiency itself is closely related to the type and source of yarn.

To test the effect of yarn manufacturing conditions on shrinkage, five lots of 30/1 cotton yarn, four combed and one carded, obtained from five different manufacturers, were knit in sequence on the same frame into a uniform rib construction. The average length shrinkage for the entire lot was 22.6 per cent, ranging from 20.6 per cent to 24.6 per cent as shown in Figure 5. Actual count of stitches revealed that the fabric knit from yarn A possessed one extra course which possibly explains why it shrank slightly less than the average. Fabric from yarn D, which shrank slightly more than the average, was carded. On the whole, however, it appears that the effect of normal yarn manufacturing condition or spinning system itself, within the range of yarns studied, has less bearing on shrinkage than knitting structure.

C. KNITTING STIFFNESS—Test of fabrics with different knitting stiffnesses showed that those with the greater number of rows of loops (courses) per inch were subject to less length shrinkage in laundering (Figure 6), but to more width shrinkage.

For a given degree of improvement in laundering stability, increasing the number of courses per inch results in much less change in the width and weight of the fabric than increasing the size of the yarn. This is demonstrated in Table I which gives an example of a fabric whose shrinkage was reduced by both methods. An increase in the size of yarn from 30/1 to 20/1 is here seen to produce less improvement in dimensional stability than an increase in knitting stiffness from 27 to 33 courses per inch, although the effect of the former on the width and weight of the fabric is much more significant than that of the latter. These changes result naturally enough from the fact that increasing the yarn size adds to the fabric structure in three dimensions—namely length, width and thickness; while increasing the number of courses adds primarily to length only.

D. STITCH TYPE—It is difficult to make a positive comparison between stitch types with regard to their effect on laun-

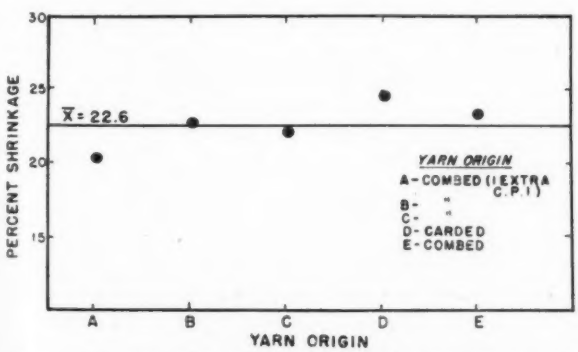

Figure 5—Length Shrinkage in Laundering of Rib Fabrics Knit from Various Yarns

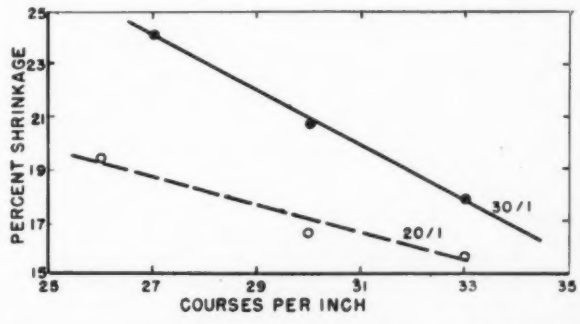

Figure 6—Effect of Knitting Stiffness on Length Shrinkage in Laundering of Rib-Knit Fabric

TABLE II

Effect of Yarn Count and Knitting Stiffness on Shrinkage, Weight and Width of Fabric

Yarn Count	*Courses per inch*	*Shrinkage (per cent)*	*Weight (oz./sq. yd.)*	*Width (inches)*
30/1	30	20.6	4.7	13.8
20/1	30	16.4	6.2	15.8
	Difference	4.2	1.5	2.0
30/1	27	24.2	4.7	13.8
30/1	33	17.9	4.9	14.0*
	Difference	6.3	0.2	0.2

* Normally a fabric with a higher number of courses per inch tends to be slightly narrower; the small increase in width noted here is possibly due to sampling variations.

dering shrinkage because of the multiplicity of factors involved. The two most common types of stitches used in Quartermaster underwear are the flat or plain stitch and the one-by-one rib. A realistic basis for comparison between these two types does not exist because, in addition to their basic geometric differences, the rib stitch is made with latch needles and the plain stitch is usually made with spring needles. It may be stated generally, however, that variation in length shrinkage of rib- and plain-knit fabrics of the type described in this paper will be minor in nature for comparable structures, and will follow the same general rules with respect to the effect of yarn size and knitting stiffness, as is characteristic for a given knit type.

For example, it may be seen in Figure 7 that fabric knit on a 12-cut rib machine shrank approximately two to three per cent less in length than a fabric knit on a 40-gauge flat machine. Since the former machine utilized 24 needles per inch (counting both the dial and cylinder needles) whereas the latter had only 20 needles per inch, less length shrinkage in the rib-knit fabric would be expected by virtue of the fact that the gauge of the machine on which it was knit was filled better than that of the flat machine. By the same reasoning the width shrinkage of the rib fabric would be greater than that of the flat fabric. Although these data do not cover a sufficiently wide range of fabrics, it may be assumed as a working hypothesis that for a given set of conditions as stated above the shrinkage of knit fabrics will be quite close regardless of whether the stitch is of the rib or flat variety.

Effect of Finishing Procedures on Shrinkage

A. WET FINISHING—It is commonly accepted that a major portion of the potential shrinkage-producing strains are introduced during the scouring, bleaching and drying processes to which underwear tubing is subjected. This hypothesis is not consistent with the results of the present study. For both the flat and rib-knit fabrics a significant reduction in length and width of the tubing occurred during the wet finishing and drying operations, resulting in a fabric, which before calendering, exhibits less potential shrinkage than in the grey state. As currently practiced, wet finishing, when considered in conjunction with drying, apparently serves to maintain a major portion of the strains produced during knitting rather than superimposing any additional strains. It is recognized that if wet finishing and drying could be accomplished without tension, a relaxed fabric would result which would exhibit a minimum of laundering shrinkage.

To obtain a better understanding of the laundering shrinkage of normally finished, as well as preshrunk underwear tubing, the course of the dimensional changes occurring during wet finishing was followed step by step by making measurements in the wet state immediately after bleaching and extracting, and after drying. The results obtained are shown in Table III.

The grey fabric was noted to contract approximately 25 per cent in width during wet processing. There was a simultaneous temporary increase in the wet length of the fabric ranging from two to six per cent as a result of the continuous tensions to which it was subjected in scouring and bleaching. After drying in a loop dryer, however, the tubing contracted to slightly less than the grey length and also contracted slightly further in width.

TABLE III

Effect of Wet Finishing on the Dimensions of Rib-Knit Underwear Tubing

	Grey Fabric	*Bleached Fabric*	*Bleached Fabric*
30/1 Yarn		—*Wet*—	—*Dry*—
Width (inches)	14.0	10.3	10.3
Length (units)	100	106	97
Wales/in.	22		29
20/1 Yarn			
Width (inches)	16.0	12.5	12.1
Length (units)	100	102	98
Wales/in.	21		26

These dimensional changes help to explain the data given in Figure 8, in which the wet-finished and dried fabric is shown to be subject to appreciably less shrinkage than the grey fabric. The width shrinkage brought about by wet finishing has increased the tightness of the fabric, thus effectively increasing the wales (corresponding to needles) per inch. Laundering of the wet-finished fabric thus produced an actual elongation in width rather

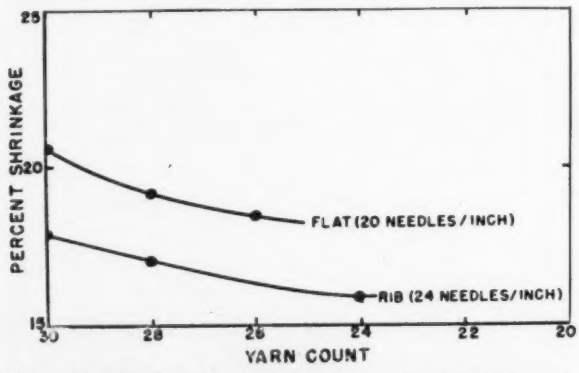

Figure 7—Effect of Type of Stitch on Length Shrinkage in Laundering of Knit Fabric

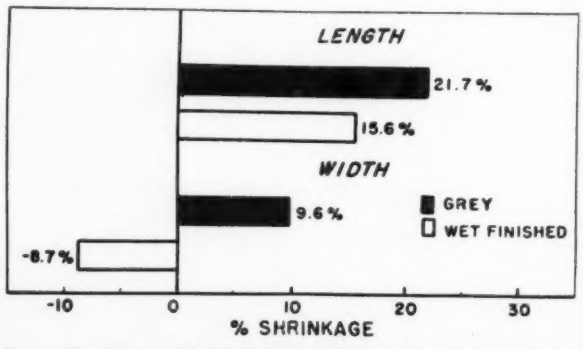

Figure 8—Effect of Wet Finishing on Shrinkage in Laundering of Rib-Knit Fabric

than a shrinkage. In addition, the consolidation or tightening of the fabric in width allowed for less length shrinkage than would have been predicted from the data in Table III.

Since the potential width shrinkage introduced in knitting is eliminated in this finishing operation, it should be practical to reduce length shrinkage by increasing the yarn size and number of courses per inch, despite the concomitantly greater potential width shrinkage caused thereby. The subsequent calendering operation could then be used to secure optimum width shrinkage while still maintaining improved length stability.

TABLE IV

Frame Combinations Used for Calendering Rib-Knit Fabrics

Sample No.	*Frame Width (Inches)*		*Finished Width of Fabric (In.)*
	Front	*Back*	*After Conditioning*
		20/1 Yarn	
1	11.0	11.0	11.7
2	14.5	14.0	12.9
3	16.5*	15.0*	13.9
4	18.5	16.5	15.0
5	20.5	17.5	15.6
6	27.0	24.0	19.1
		30/1 Yarn	
1	10.0	10.0	10.3
2	15.0	14.0	12.6
3	17.5*	15.0*	13.5
4	19.5	16.0	14.4
5	20.5	17.0	14.7
6	27.0	23.0	18.7

* These were considered to be the normal frame combinations for the constructions specified.

B. CALENDERING—Rib fabrics are very frequently calendered so that they finish 3 inches narrower than the diameter of the cylinder on which they are knit. For example, a fabric made on a 17" diameter cylinder will be calendered to finish at 14 inches (doubled width). This means an actual reduction in the circumference of the tubing from approximately 53 inches to 28 inches. To implement this practice for a given fabric, adjustments are made in frame or spreader width depending on the yarn size and knitting stiffness.

To test the effect of calendering on laundering shrinkage two series of fabrics were knit on a Wildman machine, one from 20/1 yarn and the other from 30/1, both fabrics having a knitting stiffness of 33 courses per inch. For the given yarn sizes these fabrics exhibited the best stability to length shrinkage obtainable on the particular machine. The fabrics were then bleached and dried in a conventional loop dryer and calendered using the spreader combinations shown in Table IV.

The fabrics were then laundered and the shrinkage measured in the conventional fashion. As shown in Figure 9, the fabrics calendered with greater stretch shrank more in width when laundered and less in length. In addition, for a given amount of stretch in calendering, the fabric

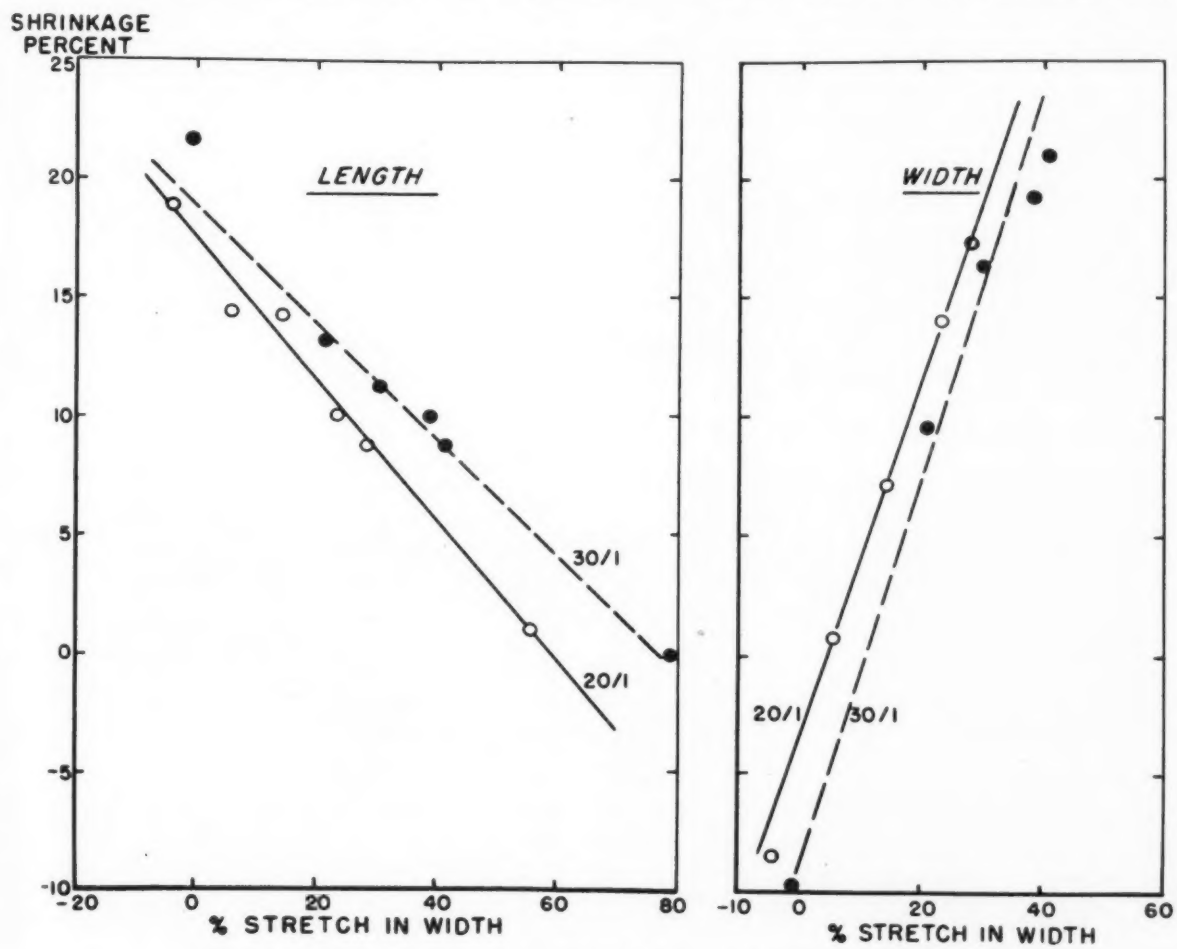

Figure 9—Effect of Stretch in Calendering on Shrinkage in Laundering of Rib Tubing

TABLE V

Relationship Between Dimensional Changes in Calendering and Shrinkage of Rib-Knit Fabrics

Width Stretch During Calendering	*Width Shrinkage in Laundering*	*Length Contraction During Calendering*	*Length Shrinkage in Laundering*
%	%	%	%
—2.9a	—9.7b	—10.8c	21.6
23.1	9.5	4.0	13.3
29.8	16.3	4.8	11.1
37.5	19.4	7.2	10.0
44.2	21.1	8.0	8.9
85.6	36.4	18.8	0

a. (—) indicates contraction.
b. (—) indicates elongation.
c. (—) indicates stretch.

made from 20/1 yarn shrank less in length but more in width than fabric made from 30/1 yarn.

As is the case with wet finishing there is a significant relationship between the dimensional changes which occur in calendering and subsequent shrinkage behavior of the fabric. Table V shows that length and width shrinkage are a definite funciton of the length contraction and width stretch to which the fabric is subjected in calendering.

In Figure 10 the length and width shrinkage of fabrics made from 20/1 and 30/1 yarns has been plotted against the calendered width of the tubing. It is apparent that it is possible to obtain, by proper choice of frames, complete shrinkage control in length or width, but, of course, not in both directions simultaneously. For most purposes, values lying near the point of intersection of the length and width curves are of most practical significance. If the tubing is calendered to the width corresponding to the intersection of the curves, then a balanced shrinkage of approximately 11 per cent is obtained in the case of the fabric made from the 20/1 yarn and a slightly higher shrinkage for the fabric made from the 30/1 yarn. In the case of rib-knit fabrics such as these it is easily possible to further improve length shrinkage by calendering wider, since shrinkages in width up to 15 per cent will be more than offset by the ease of stretching (dimensional restorability) of the one-by-one rib. Thus it may be seen that it is possible to manufacture rib fabrics having less than 10 per cent potential length shrinkage through the proper choice of knitting and calendering conditions. This would represent a marked improvement over conventionally manufactured rib tubing in which shrinkages as high as 20 per cent are common.

C. PRESHRINKING—Considerable interest has been evidenced by the Underwear Industry in the development of preshrinking processes for knit fabrics with the purpose of attaining an effect comparable to that which has been achieved for woven fabrics.

To determine the effect of a recently developed preshrinking process *(4)*, a series of experiments were made on samples of rib fabrics from the same group used in the calendering studies. In interpreting the significance of these data it should be recognized that the preshrinking conditions chosen for these fabrics appeared the best at the time they were processed. However, they do not necessarily represent the optimum conditions, which could be determined only after more extensive experimentation.

The preshrinking machine consists of two units, a shrinker drier and a calender drier. The cloth is entered into the shrinker drier (after extraction) over a spreader which stretches the moist fabric to a width slightly less than half the circumference of the machine on which the fabric was knit. Thus, fabric knit on a 17 inch diameter cylinder (approximately 53 inches in circumference) is spread to approximately 25 inches in width. The fabric is allowed to dry in the form of small folds in a basket conveyer with a current of air impinging on both sides of the fabric. The fabric is then introduced into the second unit of the machine where it is fitted over a conventional type of tubular fabric spreader, steamed and calendered between hot rolls, and passed over another conveyer differing only slightly from that in the first unit. Here the small folds are again formed and the material is subjected to a current of air from another series of nozzles. After the slight amount of moisture introduced into the fabric during the steaming operation is removed, the material is folded flat without tension.

In the shrinker drier the fabric, which was wet stretched to slightly less than half of the cylinder circumference of the machine on which it was knit, gradually contracts to slightly less than its original grey width. For example, for fabric knit with 30/1 yarn on a 17 inch head, the grey width, which was originally 14 inches, is stretched to 25 inches on entering the shrinker drier. After passing through the drier the width is 12½ inches despite its having been wet stretched almost 100 per cent. Suitable spreaders are placed on the front and rear of the calender-drier so that

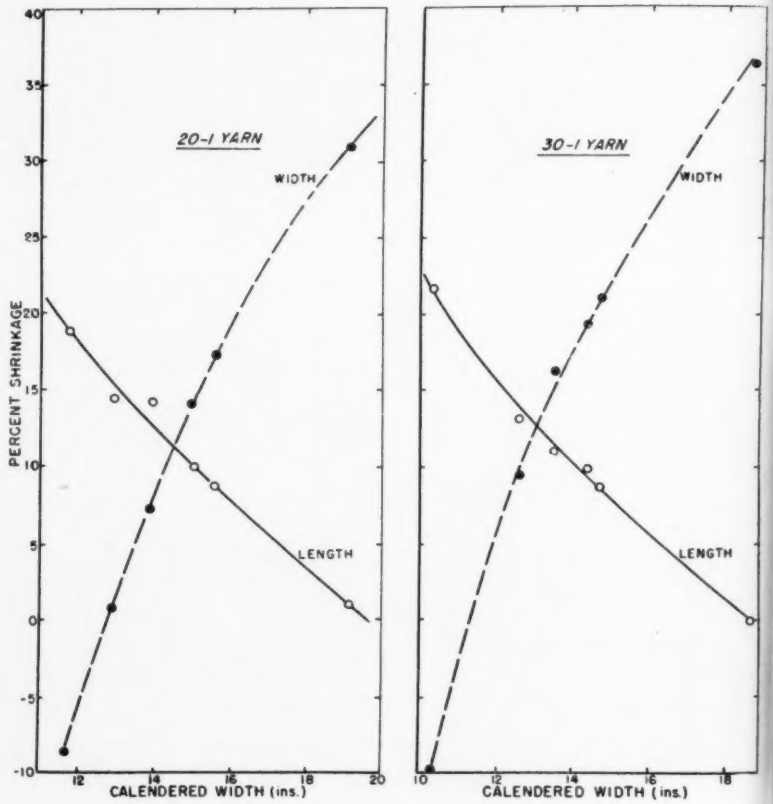

Figure 10—Effect of Calendering Width on Shrinkage in Laundering of Rib Knit Fabric

the finished width of the fabric is approximately 14 inches. This is accomplished by using a 16 inch frame on the front and a 15½ inch frame on the rear of the calendering unit. A major portion of the preshrinking takes place in the shrinker drier.

It was found that in a fabric made from 30/1 yarn, such as that described above, ten per cent of the potential shrinkage was removed in the first unit of the machine and approximately four per cent additional in the second, for a total of 14 per cent.

It may be assumed from the foregoing that fabrics preshrunk in this fashion would retain approximately the same width and would shrink in this direction to approximately the same extent as the grey fabric. With the great amount of length shrinkage removed in the two units,

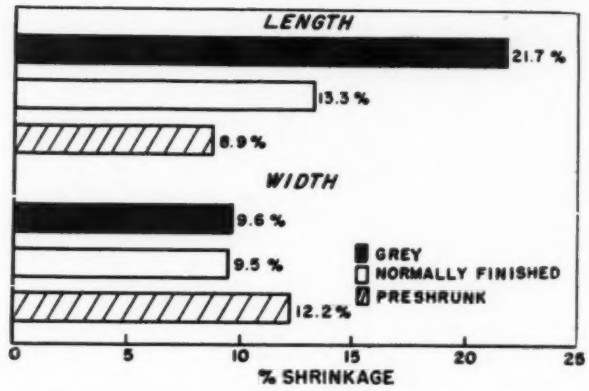

Figure 11—Effect of Preshrinking on Shrinkage in Laundering of Rib-Knit Fabric

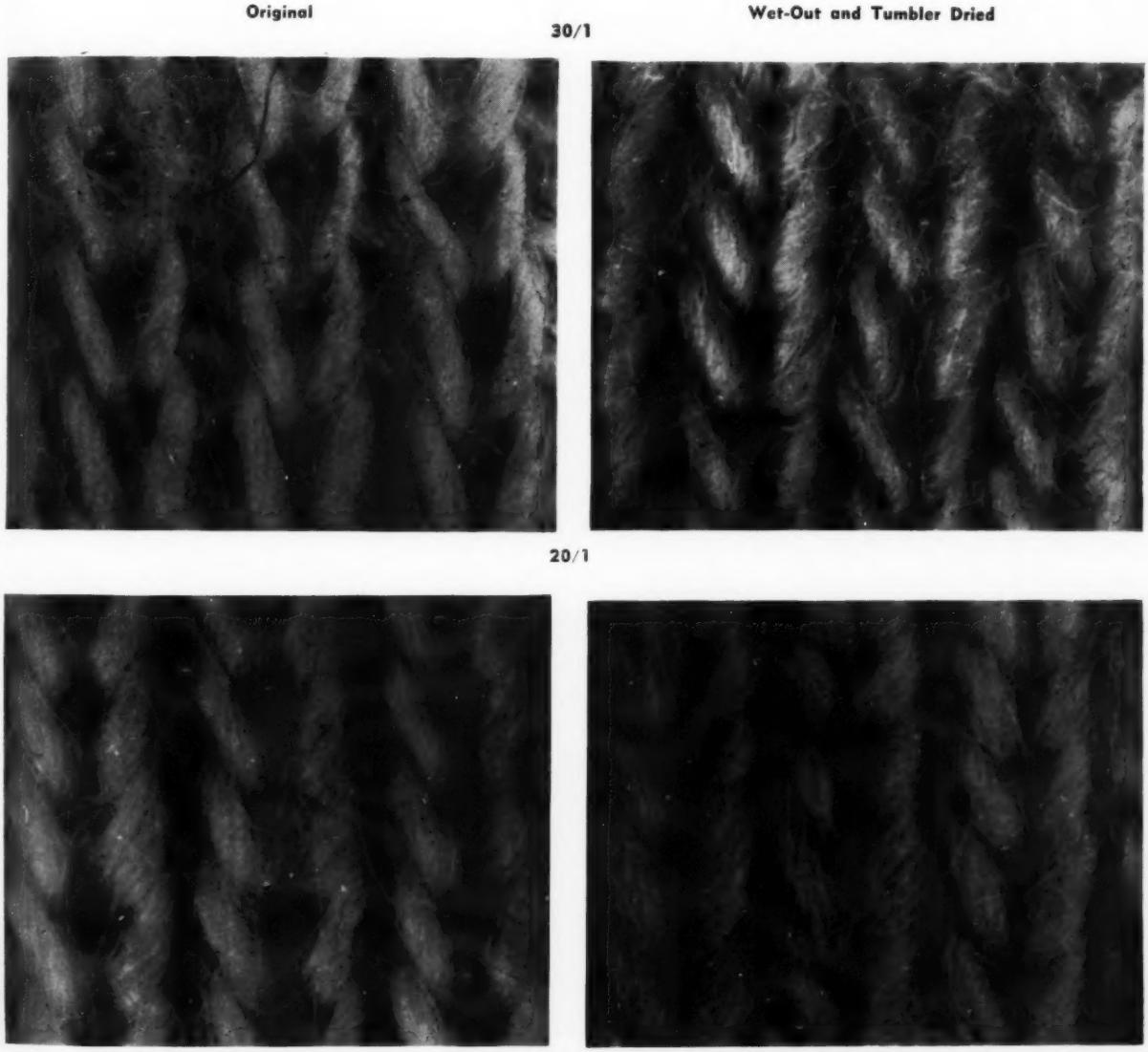

Figure 12—Effect of Shrinkage on Loop Structure of Rib-Knit Fabric

TABLE VI
Relationship Between Loop Dimensions and Shrinkage of Rib-Knit Fabrics

	Dimension of Loops (Units)		*Relative Change in Loop Dimension (Percent)*	*Actual Measured Shrinkage (Percent)*
30/1 Fabric	*Original*	*Laundered*		
Length	15.7	13.6	13.3	15.0
Width	22.9	23.3	—1.7*	2.2
20/1 Fabric				
Length	12.9	11.4	11.6	10.0
Width	23.7	21.4	9.7	10.0

* (—) sign indicates increase in dimension.

it would be expected that approximately 14 per cent less length shrinkage in laundering would occur. This was found to be the case. Shown in Figure 11 is a comparison of the length and width shrinkage of grey, normally finished and preshrunk fabrics.

Effect of Shrinkage on Loop Structure

The data presented in this report emphasize the fact that both the number of stitches along the length and across the width of the cloth have a bearing on the shrinkage of knit fabrics. It is possible to predict actual shrinkage by following the change in loop dimensions and position that takes place in laundering. For example, in a rib fabric length shrinkage should be directly proportional to the change in length of the individual loops, while width shrinkage should be proportional to the change in width of the individual loops as well as the change in distance between the loops. Shown in Figure 12 are photomicrographs of the loop structure of fabrics made with 30/1 and 20/1 yarns respectively. The loop dimensions of these fabrics were measured from the photograph both before and after a shrinking procedure which included a simple wetting out and drying in a tumbler so as to avoid excessive distortion of the fabric.

Close examination of these photomicrographs reveals that the distance from one loop to the next (widthwise) has decreased much more after wetting out and drying in the case of the fabric made from the 20/1 yarn than in the one made from the 30/1 yarn. This is in agreement with the actual shrinkage findings, since the former fabric shrank much more in width than the latter. Actual measurements given in Table VI show the close agreement between the relative shrinkage of each of these fabrics and the change in loop structure and position. Thus, as an example, the fabric made from the 30/1 yarn which shrank 15.0 per cent in length and 2.2 per cent in width showed a relative change in loop length of 13.3 per cent and loop width (including the distance between the loops) of —1.7 per cent. On the other hand, fabric knit from 20/1 yarn shrank 10.0 per cent in length and 10.0 per cent in width with corresponding relative changes in loop length and width (including the distance between the loops) of 11.6 and 9.7 per cent.

Conclusions

With respect to knitting factors it was found that:

1. A major portion of the potential shrinkage is introduced in the knitting operation.

2. Increasing the size of the yarn (decreasing the count) decreases the potential length shrinkage but increases the potential width shrinkage. Increasing the size of the yarn also produces a wider and heavier fabric.

3. For equivalent constructions and yarn sizes little difference is found in the shrinkage behavior of yarns made under different manufacturing conditions.

4. Increasing the knitting stiffness or courses per inch decreases the potential length shrinkage but increases width shrinkage.

5. For the range of yarns and fabrics studied in this survey there seems to be little difference in the shrinkage behavior of one-by-one rib and plain-knit fabrics provided there is an equivalence with respect to needles per inch, size of yarn, and courses per inch.

With respect to finishing factors it was found that:

1. Wet finishing and conventional drying produces a fabric having less potential length shrinkage than the grey fabric.

2. Practically all of the potential width shrinkage of knit fabrics is removed during the wet finishing process.

3. As a result of this fact, the benefits in length shrinkage gained by proper utilization of machine gauge, yarn size, and knitting stiffness are maintained in the finished fabric.

4. Calendering may either increase or decrease the potential shrinkage depending on the choice of frames used. Increasing the width of the frames increases potential width shrinkage and decreases length shrinkage.

5. Through proper choice of yarn, machine, knitting, and calendering conditions it is possible to produce a fabric showing a balanced shrinkage in length and width, which may range as much as one-half less in length shrinkage than a conventionally manufactured fabric.

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Appendix

Cotton Mobile Laundering Procedure

Machine—24" by 24" Rotary Drum Washer
Load—30 lbs.

	Operation	*Supplies*	*Time*	*Water Level*	*Temperature*
1.	Suds	42.5 grams Anionic detergent	5 min.	6 inches	100 F.
2.	Suds	42.5 grams Anionic detergent	5 min.	4 inches	140 F.
3.	Rinse	—	3 min.	8 inches	140 F.
4.	Rinse	—	3 min.	8 inches	120 F.
5.	Rinse	—	3 min.	8 inches	100 F.
6.	Sour	24 grams Laundry Sour	3 min.	8 inches	100 F.

After laundering, the load is extracted for 5 minutes in a centrifugal extractor and dried in a tumbler drier at a stack temperature of 160 F.

Proceedings of the
American Association of Textile Chemists and Colorists

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APRIL 17, 1950

TWENTY-NINTH ANNUAL CONVENTION

Lou Koch Service

Front View, Wentworth-by-the-Sea

The Twenty-Ninth Annual Convention, sponsored by the Rhode Island Section, will be held at New England's famous Wentworth-by-the-Sea, Portsmouth, N. H., September 28-30, 1950. The theme of the Convention is "Advance, Achieve Through Continued Cooperation."

Features will include the Council Meeting, Technical Meetings, the Intersectional Contest, the Thursday and Saturday Banquets, Friday Evening Entertainment, a Clambake, a visit to the Navy Yard, the Ladies' Program and the Exhibits (of which there will be sixty-five).

Recreational features will include golf (as well as putting and chipping courses), tennis, boating, deep sea fishing, swimming and historical sight-seeing trips.

Accommodations are available for approximately 1,400 individuals. In addition to the Wentworth-by-the-Sea, the following hotels are available: Marshall House, The Emerson and Cottages, Rockingham, Harrington, and Drake. Motels, cabins, tourist homes are available for those in excess of fourteen hundred.

THE ANNOUNCEMENT OF THE TECHNICAL PROGRAM FOR THE 1950 CONVENTION WILL BE FOUND ON PAGE P214 OF THE APRIL 3, 1950 ISSUE

The Marshall House

The Emerson

Northern New England and Rhode Island Sections—

SOME PRACTICAL ASPECTS OF HIGH-TEMPERATURE DYEING*

R. D. ROBINSON† and C. L. ZIMMERMAN‡

When the dyeing process is carried out at elevated temperatures, the rate of diffusion of the dye into the fibers is increased to such an extent that dyeings, which normally require hours, can be produced in a few seconds. These dyeings have fastness, tensile strength and other physical characteristics equal or superior to dyeings obtained by normal procedures. With the development of the Uxbridge high temperature continuous dyeing machine, it is now possible to dye wool at 25 yards per minute. The development of continuous dyeing at elevated temperatures and its application in plant scale operation is described.

IN 1938 Harold J. Walter *(7)*, president of the Bachmann Uxbridge Worsted Corporation, had the idea that if cloth could be dyed at temperatures well above the normal boiling point of water (212°F.), a better-penetrated cloth and a more rapid dyeing method might result. To develop this novel idea, a laboratory study of continuous dyeing at elevated temperatures was begun at the Bachmann Uxbridge Worsted Corporation and, three years later, at the Calco Chemical Division of the American Cyanamid Company. Some of the earlier work of this investigation covering some of the fundamental aspects of the problem has been reported in a previous publication *(6)*. The purpose of the present paper is to describe the development of continuous high-temperature dyeing from its conception to its application in plant-scale operation.

It is well known that food can be cooked faster at elevated temperatures under pressure than at the boil. Outstanding differences in cooking time that depend upon an increase in temperature are shown in Table I. Thus, when a study of high-temperature dyeing was begun at Uxbridge in 1938, the pressure cooker seemed an obvious tool for obtaining elevated temperatures. The first dyeings in this device at elevated temperatures were not very successful because of considerable decomposition of both fiber and dye. These experiments indicated, however, that some of these difficulties might be overcome by shorter immersion times.

To accomplish this, a piece of stainless-steel equipment was designed and built, as shown in Figure 1, consisting of a dye tank and two long columns filled with mercury, which acted as pressure seals. A piece of cloth, four inches wide, could be dyed continuously by passing the cloth through the entering mercury column, through the heated dye bath, which was under pressure, and then out through the other mercury column. Driven squeeze rolls over the upper part of the dye tank at the entering and exit sides were used for both squeezing and carrying the cloth through the dye bath. In this apparatus temperatures up to 270°F. and immersion times as low as 15 seconds were used. Experiments in this equipment showed that wool could be dyed satisfactorily at elevated temperatures, provided the time of immersion was short.

The mercury-sealed dyeing machine was used for a study of high-temperature dyeing to find the effect of immersion time, temperature, pressure and dye concentration upon the dyeing of wool, cotton, rayon and blended fabrics. In these experiments the wool was dyed rapidly with neutral and union-dyeing colors at a pH value near 7 and a temperature of 270°F. Strongly acid dye baths had a tendency to precipitate the dye on the outside of the fiber, giving poor penetration, and alkaline dye baths damaged the wool. Salt or dyeing assistants did not appear to improve the dyeings. Blends of cotton and wool were dyed uniformly at 255° to 260°F. with selected dyes, but at higher temperatures the wool dyed faster than the cotton.

Since a strip of cloth of four-inch width as dyed in the mercury-sealed machine, could give little indication of levelness from side to side or in the lap, a larger machine was built to accommodate 36-inch-wide fabric. A batch process was decided upon, since mercury seals were not practical and mechanical methods of sealing were still being studied. A large pressure chamber was constructed with a door on one end through which a dye tank on wheels could be inserted. The cloth to be dyed was placed on a roll at one end of the dye tank and sewed to a leader previously threaded through the machine to the wind-up roll. The tank was filled with a dye solution and pulled into the pressure chamber where steam lines and the driving mechanism were attached. The door was closed and the desired pressure was applied with compressed air. When the dye bath reached the desired temperature, the cloth was pulled through by the leader and rolled up at the other end. The time of immersion was controlled by the speed of the driving mechanism, and

TABLE I

Variation in Cooking Time with Temperature

	Time of Cooking—Minutes	
Vegetable	*At 250°F. Under Pressure of 15 lbs. per Square Inch*	*At Boil (212°F.) Under Atmospheric Pressure*
Tomatoes	½ to 1	7 to 15
Peas (Fresh)	1 to 2	8 to 20
Green Beans	1½ to 3	15 to 30
Potatoes	8	25 to 40
Peas (Dry)	15	120 to 180

* Paper presented by R. D. Robinson before the Northern New England and Philadelphia Sections of the A.A.T.C.C.

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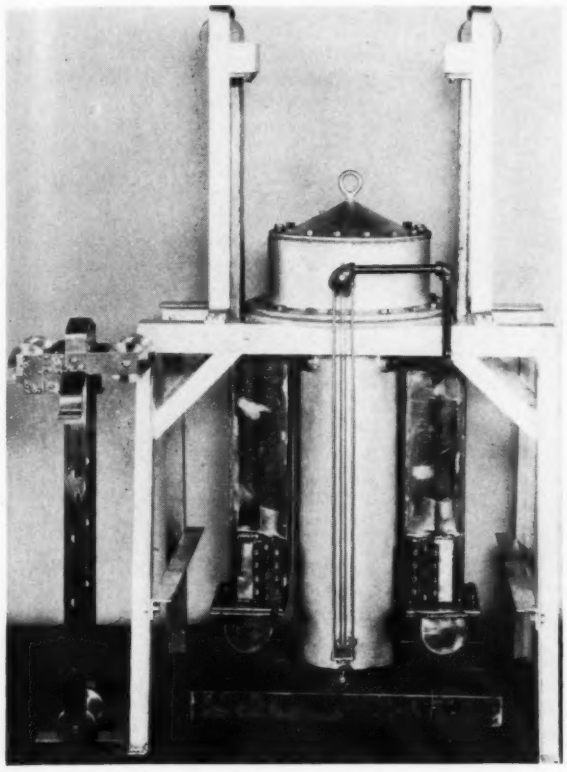
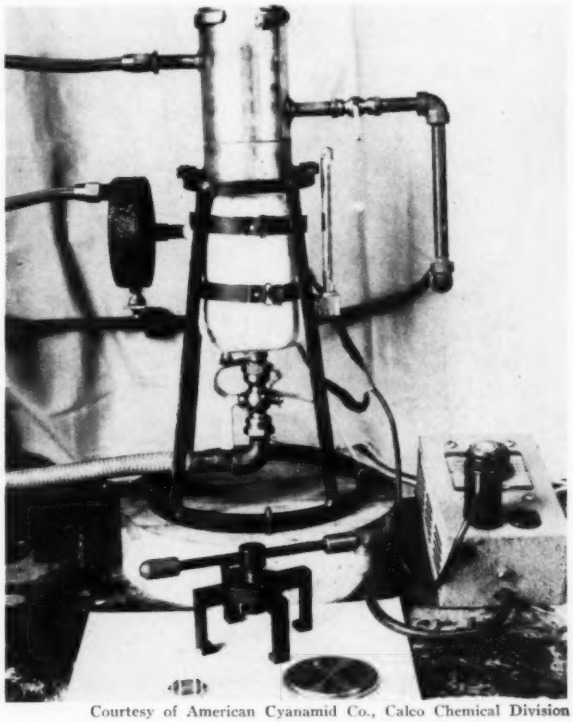


Figure 1
Mercury-Seal High-Temperature Dyeing Machine



Courtesy of American Cyanamid Co., Calco Chemical Division

Figure 2
Laboratory Noncontinuous High-Temperature Dyeing Machine

the temperature and pressure were held constant by automatic controls. After the dyeing, the bath was cooled, the pressure was released and the cloth was removed for rinsing and finishing.

The overall results were so encouraging that a machine to run continuously and to accommodate 62-inch fabric was then contemplated. However, from the beginning of the high-temperature dyeing program it had been o served that when dye solutions were held at elevated temperatures over periods of several hours, some dyes decomposed. Due to thermal decomposition of the dye and other dyeing problems, the Calco Chemical Division of the American Cyanamid Company was asked by the Bachmann Uxbridge Worsted Corporation in 1941 to co-operate in a study of the dyeing of textile materials at high temperature under pressure.

Studies were then begun to determine the amount of thermal decomposition of a large number of acid and direct dyes. These tests were made by heating solutions of dyes at 260°F. under a pressure of 30 lbs. per square inch for eight hours. Dye strength determinations were made on the solutions by measurements in the spectrophotometer. Table II shows a few typical examples of the results that were obtained. The thermal stability of other classes of dyes has been determined by the Philadelphia Section of the A.A.T.C.C. *(4)*.

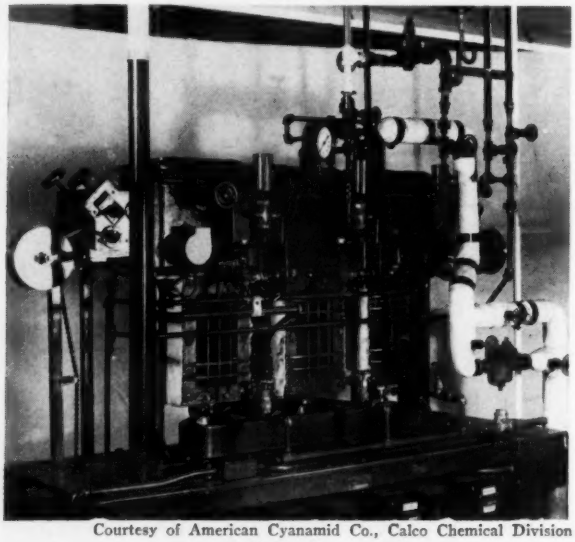
A laboratory noncontinuous dyeing unit *(5)* was designed and built at Calco for dyeing at temperatures up to 300°F. under an air pressure of 50 lbs. per square inch. This unit is shown in Figure 2 and is constructed so that a sample can be entered into a high-temperature bath without preheating or steaming and, after the desired dyeing interval, removed from the bath quickly and cooled. With this machine it is possible to dye cloth in a bath at an elevated temperature for very short immersion times and simulate a continuous operation. Some of the fundamental studies on high-temperature dyeing made in this laboratory machine have been described in a recent publication *(6)*.

In order to apply the results obtained in this preliminary investigation to continuous dyeing, a laboratory continuous high-temperature dyeing machine was also build as shown in Figure 3. This machine consisted of a pressure chamber containing three individual baths that could be used interchangeably for dyeing or rinsing. The top and side of the machine were made of glass so that the cloth could be seen during the dyeing. A set of Uxbridge pressure sealing rolls was installed at both the entering and exit ends of the machine. Cloth up to four inches wide could be dyed continuously at temperatures up to 300°F. under pressure.

In the course of the investigation it became apparent that there were many dis-

TABLE II
Thermal Decomposition of Dyes After 8 Hours at 260°F.

Name of Dye	*C.I. No.*	*% Decomposition*
Calcocid Milling Red 3B	487	0-10
Calcocid Orange Y	151	0-10
Calcomine Brilliant Yellow Conc.	365	0-10
Calcomine Black BHD 145%	401	0-10
Calcomine Blue 2B Ex. Conc.	406	10-20
Calcomine Red FC	419	10-20
Calcodur Orange GL	653	10-20
Calcocid Milling Orange GSC Conc.	Pr. 151	20-50
Calcomine Blue DR	—	20-50
Calcomine Black F Conc.	—	20-50
Calcocid Blue Black Ex. Conc.	202	>50
Calcocid Navy Blue 2G	288	>50
Calcodur Blue 8GL	Pr. 27	>50



Courtesy of American Cyanamid Co., Calco Chemical Division

Figure 3
Laboratory Continuous High-Temperature Dyeing Machine

advantages in dyeing continuously from a concentrated dye bath. To overcome some of these disadvantages, a modified method was developed which consisted of first padding the cloth with an aqueous solution of dye at normal (below 212°F.) temperatures and then developing the padded cloth in an aqueous bath at elevated temperatures. Padding offered a very convenient method for controlling the shade and also a practical way for feeding dye into the machine at the desired rate.

It was found that regular cotton padding techniques could not be used in padding wool. An extended study was therefore made to determine the effect of different variables upon the padding of cotton, wool and rayon, including the following: chemical and physical constitution of the cloth; addition of wetting agents to both the cloth and bath; variations in pH, temperature, viscosity, and composition of the dye bath; number of dips and nips; time of immersion; speed of padding and pressure between the squeeze rolls. The results of some of these studies at Calco have been published in part *(9)* and the remainder will appear in future publications. In general it was found that the paddings must be even and uniform since little leveling can take place in the very short developing times used. The depth of shade is controlled by the concentration of the padding solution and the pick-up. In padding with acid and direct dyes, it was found that the best results were obtained when the dye was completely in solution. It thus became necessary to determine the solubility of acid and direct dyes and also to find methods of increasing their solubility. A method of determining dye solubilities at a specified temperature was developed and published recently *(8)*, together with the solubility in water of a number of acid and direct dyes. It was found important to pad wool at low temperatures (100°F.) in order to prevent preferential sorption of either water or dye. In order to express preferential sorption mathematically, a new term, *dye-pick-up factor* (abbreviated D.P.F.), has been proposed *(9)*. The D.P.F. is defined as the ratio obtained by dividing the amount of dye actually on the cloth, as determined by analysis, by the amount of dye that should be on the cloth, as calculated from the pick-up, and then multiplying this fraction by 100. Thus, a D.P.F. greater than 100 shows that dye was exhausted from the pad box. A D.P.F. less than 100 shows that water was preferently sorbed. In ideal padding, the dye and water are picked up in the same ratio as in the padding bath to give a D.P.F. of 100. The effect of a variation in the pressure on the squeeze rolls and the hardness of the squeeze rolls upon both the pick-up and D.P.F. is shown in Tables III and IV.

Preliminary laboratory studies of developing baths *(6)* have shown that when

TABLE III
Effect of Pressure and Roll Composition on Padding
Wool Padded with Calcocid Orange Y

	Pressure Dial Setting on Padder														
	1			*2*			*3*			*4*			*5*		
Composition of Padder Rolls	*Press. Lb. Per Sq. In.*	*% Pick-Up*	*D.P.F.*	*Press. Lb. Per Sq. In.*	*% Pick-Up*	*D.P.F.*	*Press. Lb. Per Sq. In.*	*% Pick-Up*	*D.P.F.*	*Press. Lb. Per Sq. In.*	*% Pick-Up*	*D.P.F.*	*Press. Lb. Per Sq. In.*	*% Pick-Up*	*D.P.F.*
Hard Rubber Against Steel	28	58	103	111	46	108	155	43	104	203	41	99	206	46	98
Hard Rubber Against Hard Rubber	33	82	103	99	53	100	154	50	96	187	47	98	188	46	100
Soft Rubber Against Steel	25	82	89	83	78	79	122	59	96	151	56	101	154	54	104
Soft Rubber Against Hard Rubber	20	84	94	71	69	96	100	62	96	125	59	100	129	57	100
Soft Rubber Against Soft Rubber	27	88	102	55	72	96	86	64	95	102	61	92	106	56	113

TABLE IV

Effect of Pressure and Roll Composition on Padding
Cotton Padded with Calcomine Navy R

Composition of Padder Rolls	Pressure Dial Setting on Padder														
	1			2			3			4			5		
	Press. Lb. Per Sq. In.	% Pick-Up	D.P.F.	Press. Lb. Per Sq. In.	% Pick-Up	D.P.F.	Press. Lb. Per Sq. In.	% Pick-Up	D.P.F.	Press. Lb. Per Sq. In.	% Pick-Up	D.P.F.	Press. Lb. Per Sq. In.	% Pick-Up	D.P.F.
Hard Rubber Against Steel	28	56	132	111	49	126	155	46	131	203	45	125	206	42	133
Hard Rubber Against Hard Rubber	33	64	98	99	49	102	154	45	109	187	44	108	188	44	109
Soft Rubber Against Steel	25	72	102	83	61	107	122	57	110	151	52	114	154	52	101
Soft Rubber Against Hard Rubber	20	73	92	71	61	95	100	58	98	125	52	105	129	52	109
Soft Rubber Against Soft Rubber	27	66	94	55	55	102	86	54	103	102	49	106	106	51	97

the padded cloth passes into the developing bath a number of things occur simultaneously. Part of the dye is washed off the padded cloth by the developing bath. The textile fiber starts to swell and dye begins to diffuse into the fibers. At the same time, dye in the developing bath begins to dye the fibers. In continuous dyeing, a dynamic equilibrium is established in the development bath such that the amount of dye brought in by the padded cloth is equal to the amount carried out by the dyed cloth. In order to establish this equilibrium, the conditions in the developing bath must be fixed so that, while the padded cloth is passing through the developing solution, the amount of dye bleeding off is equal to the amount dyeing back on the cloth. The concentration of dye necessary in the developing bath for equilibrium has been found to depend upon the dye used, the strength of the padding, the time of immersion, the temperature of the developing bath and the composition of the developing bath. As pointed out by Casty and Krahenbuhl *(2)* it is not dependent upon the cloth-developing-bath ratio. However, the equilibrium described above is not the type of equilibrium Casty and Krahenbuhl obtained in their continuous dyeing method, nor is it that obtained in ordinary dyeing in which the cloth is left in contact with the dye bath until both the shade of the cloth and the concentration of the dye bath remain constant. In high-temperature dyeing the cloth never remains in contact with the developing bath long enough for this type of equilibrium to be estab-

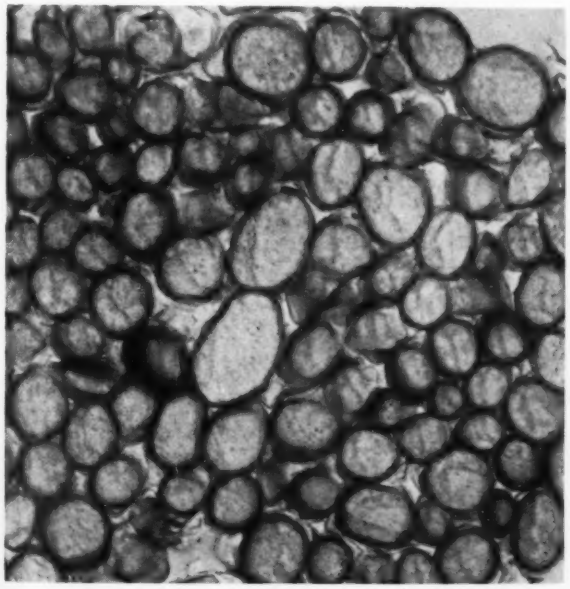


Figure 4
Cross Section of Wool Dyed at 200°F.

Figure 5
Cross Section of Wool Dyed at 212°F.

Figure 6
Cross Section of Wool Dyed at 210°F. for 50 Seconds

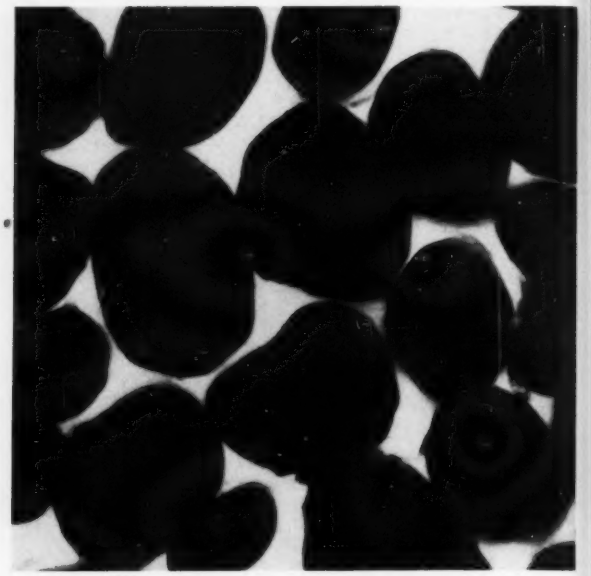


Figure 7
Cross Section of Wool Dyed at 290°F. for 50 Seconds

lished. In high-temperature dyeing the amount of dye required for equilibrium is probably a function of the initial dyeing rate *(3)*.

The effect of pH upon dyeing varies with both the type of fiber and the type of dye used. In high-temperature dyeing, as in ordinary dyeing, the rate of dyeing of acid colors on wool is a function of the pH of the dye bath. In the continuous dyeing of wool with acid dyes it is necessary to maintain a constant pH in the developing bath if even dyeings are to be obtained. The best penetrated and most level dyeings have been obtained at pH values ranging from 4 to 6; thus, acetate and phosphate buffers have been used in the developing bath to maintain a constant pH in this range. Since the increase in temperature greatly increases the initial rate of dyeing, it is often necessary to dye at a pH above that normally used in order to obtain level dyeings.

In wool dyeing, even an increase in temperature from 200°F. to 212°F. causes an increase in dye penetration and also, with many dyes, gives added color value. This has been shown to be the cause of the difference in color value and penetration between laboratory dyeings made at a vigorous boil and open-kettle dyeings, which usually never reach a temperature much higher than 200°F. *(1)*. Figures 4 and 5 show cross sections of such dyeings and illustrate the difference in diffusion into the individual wool fibers after one hour. This difference in color value and penetration is magnified as the temperature is increased. Figures 6 and 7 show cross sections of wool dyed with Calcocid Wool Blue B (C.I. 209) for 50 seconds at 210°F. and 290°F., respectively. The dyeing made at 210°F. shows very poor penetration, whereas the dyeing made at 290°F. shows very good penetration and fiber levelness. This dyeing, made for 50 seconds at 290°F., shows even better penetration and fiber levelness than a similar dyeing, shown in Figure 8, which was made at 210°F. for two hours by the standard dyeing procedure recommended for this dye. In general the rate of dyeing is increased and thus the time of dyeing decreased by an increase in the temperature. In addition to wool, dyeings have been made on cotton, viscose, Aralac, cellulose acetate, silk, nylon, immunized cotton, goat hair, cashmere, rabbit fur, linen, alpaca, mohair and polyacrylonitrile fibers ("Orlon"). The increase in dyeing rate with rise in temperature is not so marked in the case of cellulosic fibers,

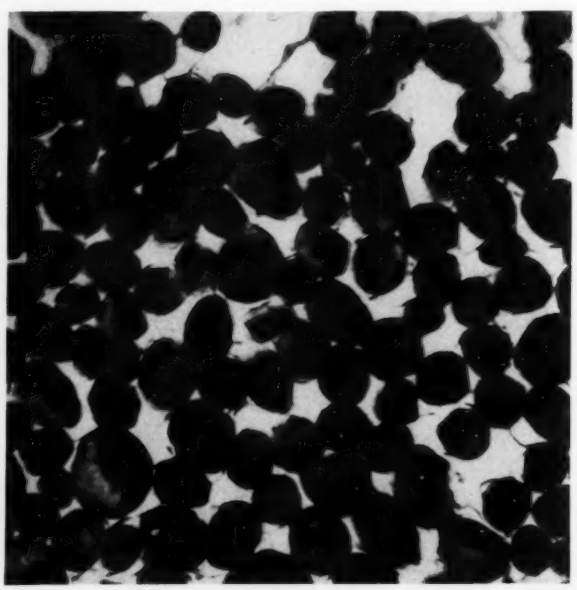


Figure 8
Cross Section of Wool Dyed at 210°F. for 2 Hours

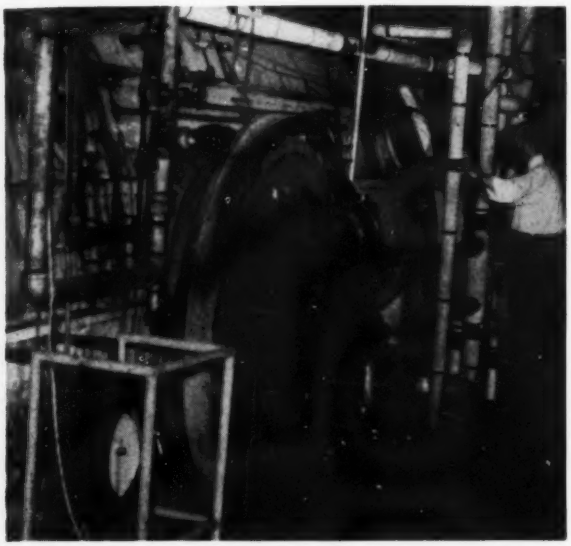


Figure 9
Pressure Chamber of High-Temperature Continuous Dyeing Machine

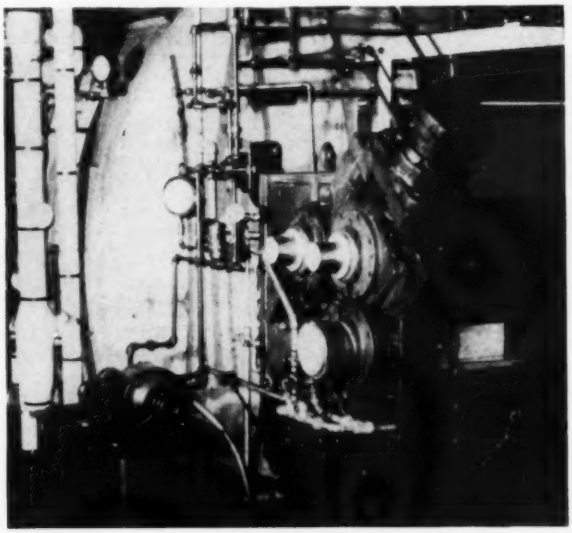


Figure 10
Pressure-Sealing Rolls on High-Temperature Continuous Dyeing Machine

however, as it is with nitrogenous fibers. The dyeing of "Orlon" at a high temperature shows considerable promise as a means of dyeing this resistant fiber.

Textile fibers, with the exception of cellulose acetate, do not appear to be damaged when dyed at elevated temperatures if the time of immersion is short. Wool skeins were dyed in a 3% solution of Calcocid Wool Blue B (C.I.209) in the laboratory apparatus at temperatures varying from 210°F. to 290°F. The time of dyeing was varied so that all the samples had approximately the same depth of shade. Tensile-strength measurements of these dyeings, given in Table V, show

TABLE V

Tensile Characteristics of Wool Dyed at High Temperature In 3% Solutions of Calcocid Wool Blue B (C.I. 209)

Temperature of Dyeing °F.	*Time of Dyeing Seconds*	*Tensile Strength Pounds*
290	34	1.7
280	40	1.8
270	50	2.0
260	60	2.0
250	100	2.2
240	140	2.1
230	220	2.1
220	300	2.1
210	480	2.2
Undyed Wool		2.1

that dyeing at temperatures up to 270°F. for the times indicated causes no loss in tensile strength within experimental error. At 280°F. and 290°F. there is a slight loss in tensile strength. Table VI shows the effect of high-temperature dyeing on the tensile characteristics of several other textile fibers, and it can be seen that the tensile strength of cotton, viscose, and nylon is not decreased. Acrylonitrile fibers ("Orlon") also have been dyed with no apparent loss in tensile strength. Cellulose acetate, on the other hand, is damaged at elevated temperatures.

As a result of a number of successful laboratory and semicommercial dyeings,

Figure 11
Developing Tank in High-Temperature Continuous Dyeing Machine

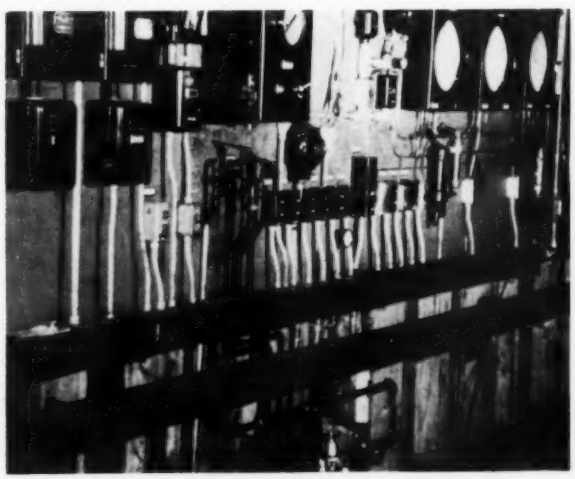


Figure 12
Control Panel for High-Temperature Continuous Dyeing Machine

TABLE VI

Tensile Strength Data for Fibers Dyed at 270°F.

	Before Dyeing	After Dyeing
Cotton Unbleached Sheeting Warp	40	47
Filling	45	45
Viscose-Dyed Cloth Warp	106	111
Filling	79	76
Nylon Warp	98	109
Filling	88	104
Acetate Warp	60	13
Filling	28	14

the process of padding the dyestuff and then developing at a high temperature was introduced into the Uxbridge 62-inch-width continuous dyeing machine. This equipment consists of two main parts, a padder and a pressure chamber for dyeing or developing.

The padder consists of a stainless-steel immersion or pad box and two rubber rolls, each roll being 76¼ inches wide and 18 inches in diameter. Pressure is applied to the squeeze rolls by air and must be adjusted so that it is greater than the pressure on the sealing rolls.

After being padded, the cloth passes into the pressure chamber, shown in Figure 9, through a set of sealing rolls, which were designed to hold back 50 lbs. of pressure per square inch while in motion. These sealing rolls, shown in Figure 10, consist of two steel rolls with a rubber roll pressed against them. Air is prevented from leaking around the sides and ends of the rolls by an elaborate set of cross seals.

After passing through the seal rolls the cloth enters the tank containing the developing or dye bath, which is at an elevated temperature. The developing tank, shown in Figure 11, contains approximately 1500 gallons of solution and at present can accommodate open-width cloth up to 62 inches wide. The developing tank holds about 42 yards of cloth and the immersion time can be varied by controlling the running speed.

The whole machine is operated from a single panel board shown in Figure 12. On this panel are controls for varying speed, immers.on time, temperature, pressure, feed pumps to padder and to the developing tank, circulation pumps, volume level, and pH.

Cloth, after being wet-finished and dried, passes through the pad box and squeeze rolls, where a controlled amount of dye is applied. The wet padded cloth passes over a set of speed-compensating or dancer rolls and then through the top nip of the sealing rolls into the pressure chamber. Then the cloth, after passage over a second set of compensating or dancer rolls, enters the developing solution, where it is dyed in a few minutes at an elevated temperature. The dyed cloth passes through a set of squeeze rolls at the end of the developing tank, then over another set of compensating or dancer rolls and out of the pressure chamber through the lower nip of the seal rolls. The dyed cloth is then ready for rinsing and finishing.

Summary

The high temperature technique increases the speed of dyeing to such an extent that dyeing, which normally requires hours, can now be produced in a matter of minutes. With this method nylon has been dyed continuously at 275°F. during a 75-second immersion time to the same shade as that obtained in one hour at the boil; only one minute was needed to obtain the same depth of shade on wool at 275°F. as that requiring two hours at 200°F. These dyeings had fastness, tensile strength and other physical characteristics equal or superior to dyeings obtained by normal procedures.

Continuous dyeing processes have great advantage over the batch method, not only in the time saved in loading and unloading kettles, but also in the total time required for dyeing. With the development of the Uxbridge high-temperature continuous dyeing machine it is now possible to dye wool at 25 yards per minute, and possibly faster when certain mechanical improvements can be achieved.

Literature References

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(5) Royer, G. L. and Stearns, E. I., Jr., U.S.P. 2,405,167 (Aug. 6, 1946).

(6) Royer, G. L., Zimmerman, C. L., Walter, H. J., and Robinson, R. D., Text. Res. J., *18*, 598 (1948).

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(8) Zimmerman, C. L., and McCleary, H. R., Am. Dye. Rep., *37*, 47 (1948).

(9) Zimmerman, C. L. and Royer, G. L., Text. Res. J., *18*, 615 (1948).

EMPLOYMENT REGISTER

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the Secretary of the Association, Lowell Textile Institute, Lowell, Mass. It is understood that these will be open to inspection by prospective employers, who can obtain further information from the Secretary.

50-8

Education: Navy Flight School and Quartermaster Administration during war. New Bedford Textile Institute, receiving B.S. in textile chemistry, dyeing and finishing, June, 1950.

Experience: Salesman, part time during college work.

Age 30; married; references.

4-3, 4-17

50-9

Education: Textile High School.

Experience: Superintendent of Dyeing and Finishing.

4-3, 4-17

50-10

Education: New Bedford Textile Institute, textile manufacturing; with further textile studies in Mass. Inst. of Tech., and in Quartermaster Corps.

Experience: Manufacture of yarns and fabrics, including fabric design, plant layout and administration; direction of chemical and physical testing.

Age 42; married; references; Southern States preferred but not essential.

4-17, 5-1

50-11

Education: Bradford Durfee Technical Institute, honor student, to receive B.S. in 1950.

Experience: Chemist and laboratory head for 4½ years.

Age 32; married; references; New England or N. Y. State preferred, or middle West.

4-17, 5-1

AN INTERESTING EXAMPLE OF COOPERATION

A situation that might have developed unsatisfactorily has benefited from our policy of cooperating with other organizations and associations. The extensive tests made by the Wash Fastness Subcommittee resulted in much data which were difficult to interpret. The facts were finally boiled down in a report "Complaints on Colored Fabrics in Laundering." Before this was released discussions were held with official representatives of the laundry industry, which resulted in the preparation of a report by them presenting their views on the A.A.T.C.C. report and the data developed by the Subcommittee.

The Wash Fastness Subcommittee is now engaged in a program to develop a new procedure which will replace the present #3 Wash Test.

Both reports follow:

A.A.T.C.C. REPORT

Complaints on Colored Fabrics in Laundering

Technologists of the American Association of Textile Chemists and Colorists, after a five-year investigation, have concluded that modern laundry techniques, as generally practised, are susceptible of further improvement. Facts have been revealed which indicate how these improvements may be made. These facts are of interest to the laundry industry, to the processors of the many fabrics which go into our articles of clothing, and, of course, to the ultimate consumer who is the customer of both industries.

Laundering of clothes as a process probably antedates the beginning of recorded history. Crude processes for crude fabrics represented one stage in the development of laundering. Succeeding stages involved refinements in processing, increased availability of suitable detergents and developments in fabric contsruction. A real industry, however, could only be built around controlled mechanical processing and controlled detergent composition. That the industry developed is by now an easily recognized fact.

The synthetic dye industry in its own development produced dyes which measured up to the requirements of laundering, so that gradually colored garments became available which retained their attractive appearance throughout their normal life of wear and laundering.

The dyers, printers and finishers of fabrics were quick to adopt the outstanding products which enabled them to satisfy their trade, and the growth of their industry has been due to their resourcefulness in making these fabrics available at prices which have encouraged their widespread adoption.

Technical knowledge in the laundering industry developed likewise so that much is known of the effects on the textile materials of detergents, mechanical action, temperature and time factors. The laundry industry is, however, very widely distributed in many relatively small units and is beset by the usual economic factors so that there appears to be a great variety of approaches to a problem that is inherently technical upon the part of many operators, who are not technically trained.

Shortly after it was founded the A.A.T.C.C., as part of its general program of developing test methods, attacked the problem of setting up a test for wash fastness of textile materials which should predict behavior of those textiles in commercial laundering. Committee activity which was primarily concerned with color fastness resulted in the development of a piece of mechanical equipment eventually called the Launder-Ometer, which permitted twenty tests to be run at one time under controlled conditions. By suitable adjustment of the equipment and test methods a standard test was set up which was recognized as being generally representative of five commercial launderings. This permitted much work to be done in the laboratory to predict behavior in use so far as launderability was concerned. This program was started twenty years ago and brought up to date on several occasions since that time.

Some few years ago it became evident to those interested in consumer experience that complaints of poor wash fastness were becoming increasingly frequent involving cloth so processed as to pass the Launder-Ometer test. After preliminary investigation of some of these complaints the Research Subcommittee on Fastness to Washing organized a comprehensive program planned to determine the facts in the more recent situation. Forty-one different commercial cloths were selected—eighteen of which were piece dyed, five yarn dyed and eighteen printed. These were subjected to tests at eleven commercial laundries in eight different types of home laundering equipment and in the Launder-Ometer—thirty consecutive washings being made in each case with samples collected for inspection at regular intervals. Four thousand yards of material in 15,000 individual pieces were involved in the tests. Twenty-five thousand gradings had to be made.

After all this work had been done a number of facts stood out clearly. In the first place there was demonstrated that some of the laundries not only removed the dye much more quickly than others but also caused physical deterioration of the fabric much more quickly as determined by "breaking strength" determinations of the washed textile material. The variability of the results among the different laundries is all the more surprising when one considers the outstanding work done by the American Institute of Laundering in attempting to standardize procedure, chemical and soap additions and concentrations and ratio of load to liquor in the laundry machines. Since the Institute can only determine and publicize the facts among its members there is no assurance that the recommendations will be followed. Many laundries are not members of the Institute nor do they have their own technical facilities. There is a great temptation to increase the size of the load in the machine which alters the ratio with respect to the liquor. This is confirmed by the fact that repeated tests run according to Commercial Standard CS59 of the N.B.S. caused distinct physical degradation of the fabric. This is an accelarated test set up to predict behavior with respect to shrinkage and involves a relatively high ratio of cloth to liquor.

Tests run in home washers also showed wide variation in color and physical damage. Agitator types, if overloaded, can cause similar difficulties to those described for some commercial laundries.

One disturbing aspect is that dyes of known best wash fastness fail to withstand the destructive action of some commercial laundries, and also fail to give satisfaction in some home laundry washers despite the fact that the manufacturers of those washers have designed them to be effective in cleaning without unduly affecting the colors or the textiles.

After the dyers, printers and finishers of textiles by intelligent color selection have

produced the best possible colored fabrics, they are perplexed by reports of failures in laundering of those fabrics. They can only hope that education and publicity will induce others in closer contact with the consumer to acquaint the public with the fact that the remedy for wash fastness failures is in most instances greater care in washing. By education, also, they can hope to secure recognition on the part of the commercial laundrymen and the home laundry washer operators that proper handling will extend the useful life of the better grades of textiles available today.

LAUNDRY INDUSTRY REPORT

Laundry methods, along with the methods of most other industries, have changed over a period of years as a result of research and experience and because new materials and new machinery have become available. They have also changed to meet the requirements of new fibers, fabrics and dyes. Such evolutionary changes may be expected to continue in the years to come. The laundry industry is made up of small units which, except in rare instances, can not afford to hire technicians. However, these units steadily receive current information in regard to technical advances in the laundry from the American Institute of Laundering, affiliated state organizations, through their own technical journals and from the manufacturers of laundry supplies. Through these channels information with regard to new developments of value to the industry is disseminated throughout the country and through such means, processes of new but proven value are gradually put into use by the industry. It may be confidently expected that any new information developed as a result of the work of this A.A.T.C.C. Committee, relative to improved methods of washing colors will, in a relatively short time, affect the general processing methods of the laundry industry.

The laundry industry has, for many years, believed that the removal of color from fabrics during laundering was very largely a chemical and solubility process. For this reason, such factors as temperature and alkalinity have been carefully controlled and the use of chlorine bleach strongly frowned upon. This concept of proper colored work washing still remains true for many types of colors, but the work of the A.A.T.C.C. Committee on Fastness to Washing, has indicated that the amount of mechanical action produced by the washing process is also of great importance.

The commerical laundries scattered throughout the country which washed the forty-one samples of colored fabrics for the Committee, submitted their washing formulas at the same time that they returned their washed samples. A careful examination of the data submitted in these formulas does not give any clue as to the large variations shown in the rate of color removal by the different laundries. It was at first believed by the Committee that these variations were due to variations from the washing formulas submitted. In order to check this condition the Committee had two sets of the same forty-one samples washed in another laundry under carefully controlled conditions. The formula used called for moderate alkalinity and washing temperatures, but not withstanding these conditions, the amount of color removed was above the average shown by the samples tested in the laundries which originally processed them.

The information obtained in this latter series of tests and in laboratory tests indicated that the differences in the amount of color removed by the cooperating laundries from the test samples must have been due in part to variations in the amount of mechanical action produced by the washing processes employed.

Any washing formula, whether run in a commercial laundry or in a home washing machine, must meet certain specifications if it is to be satisfactory. The soil removal characteristics of the formula must be such that the washing will produce a clean load. This requires a certain amount of mechancial action and washing supplies which will produce proper detergency. The white areas of the colored articles and even the colored portions must not be contaminated with dye removed from the colored areas. For this reason, the formula must be so designed with respect to temperature and alkalinity that bleeding will be kept at a minimum. The low temperatures and alkalinities required to prevent color bleeding also reduce the detergency of the washing formula, and a certain minimum amount of mechanical action is necessary to produce adequate soil removal.

The detergency of the colored work formula used in rechecking the forty-one samples for the Committee was determined using four different types of soil pieces. The results on these soil pieces indicated that the colored work washing formula used had a detergency noticeably under that of a typical white work formula. Results published by Pennsylvania State College also indicate that the average colored work formulas have a lower detergency than the white work formulas used in the same plants. It is, therefore, not likely that the rate of color removal in colored work formulas can be reduced by lowering the detergency of the washing formula.

Colored loads normally contain more soil than do white work loads and for this reason the wheels are usually underloaded instead of over-loaded. However, over-loading of laundry washwheels does not of itself produce increased mechanical action, and, therefore, should not be expected to produce excess rates of color removal. The work on detergency over a period of many years has indicated that the best detergency occurs in wheels which are slightly under-loaded according to manufacturers ratings and presumably it is with loads of this type that the highest amount of mechanical action occurs. The amount of mechanical action in a wheel can also be measured by the electrical input of the motor driving the wheel. Tests by this method indicate that the highest rate of mechanical action occurs with slightly under-loaded wheels and the rate of loading to produce maximum mechanical action as indicated by the electrical input method is very close to that as determined by detergency tests to produce the best rate of soil removal.

The home washer which gave color removal values equal to the average shown by the laundry washing tests had a rated capacity of nine pounds but the load washed was only five pounds. This is another indication that it is not overloading which produces color removal. It is also worthy of note that the liquor ratio in the case of this home washing machine was one to twenty-five while the ratio in a laundry wash wheel is approximately one to five. It is, therefore, a combination of factors and not the liquor ratio alone which determines the amount of mechanical action produced by a washwheel.

Any changes in colored work washing methods which would reduce the rate of color removal without the sacrifices of satisfactory detergency would be of value to textile manufacturers, dyers, consumers and laundryowners alike. The information so far obtained by the Committee does not indicate in what manner colored work formulas should be changed to reduce color removal, but the fact that some laundries (using presumably adequate washing methods) do produce less color removal than others indicates that there may be a solution to the problem. This is a problem which deserves a thorough investigation.

The removal of color by washing is not a problem which must be solved by the laundry industry alone; it is also in a considerable measure, a problem of the dyer and printer. Samples exhibited at the last convention of the American Association of Textile Chemists and Colorists showed that there was a wide variation of fastness of a certain dye or dyes, depending upon the methods used in applying

them to the fabric. There is good reason to believe that the insoluble dyes which are relatively inactive chemically are removed from a fabric by processes similar to that by which soil is removed. If such dyes are to have good fastness, it will, therefore, be necessary that dyeing or printing methods be used which cause the dye to be thoroughly fixed and deeply impregnated into the fabric and fibers of the cloth. No washing process of adequate detergency can be expected to give low rates of color removal where these factors have not been achieved by the dyer.

The present Launder-Ometer tests do not accurately predict how many colored textiles will react to laundering, and test methods which will accomplish this result are still in the process of development by the Committee. When such test methods have been developed and accepted by recognized scientific associations, then both the textile and laundry industries will have standards against which they can gauge their product or processes.

The laundry industry is very desirous that colored textiles shall be produced which can be washed satisfactorily, and it also recognizes that it has an obligation to wash such textiles by approved methods, so that they may give the fullest satisfaction to the ultimate consumer.

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Rhode Island Meeting Report

THE March Meeting of the Rhode Island Section was held Friday, March 24 at the Providence (R.I.) Engineering Society Hall.

Dr. Harold W. Stiegler, Director of Research, discussed the A.A.T.C.C. research program and organization and also the various projects now under way in a talk "Your A.A.T.C.C. Research Activities and Projects." The talk was supplemented with a demonstration of the new Accelerotor.

Photo by Kenneth C. Everett.

Harold B. Sturtevant Hits a Humorous Note

Harold B. Sturtevant, Instructor at the Rhode Island School of Design spoke on "Textile Education is Modern", a review of current trends in methods now being used in our textile schools.

Photo by Kenneth C. Everett.

Dr. H. W. Stiegler Demonstrating the Accelerotor to R. I. Section

NNE Spring Meetings

THE April Meeting of the Northern New England Section will be held Friday, April 21 at the Lowell Textile Institute, Lowell, Mass. This is the annual joint meeting with the student chapter. The program has been arranged and will be carried on by the students. This will include an exhibit in Southwick Hall at 5:30, prepared in conjunction with the National Institute of Cleaning and Dyeing, which will show garments before and after cleaning. The problems of the dry cleaner will be clearly shown. Dinner will be served at 6:30 after which Charles R. Trommer of the Graduate School will present a paper on "A New Method of Measuring Penetration and Wetting". This will emphasize the penetration phase of wetting to a greater extent than the present Draves Test. The method reportedly makes possible the recognition of those wetting agents which are also good penetrants by making a distinction between those surface active agents which have spreading power but relatively low penetrating effect.

The May Meeting will take place at the Merrimac Country Club, Methuen, Mass. on Friday, May 19th. The facilities of the club will be available during the day to members of the section and their guests. Dinner will be served at 6:30. The program at 8:00 will consist of two papers, "Effort to Rate Sulfuric Acid Dyeing Dyestuffs with Respect to Level Dyeing" by E. W. Rhael, Sandoz Chemical Works Inc., New York, N. Y. and "Discussion of Level Dyeing Based on Dyehouse Observations" by A. J. Carbone, Sandoz Chemical Works, Inc., Boston, Mass.

Reservations in both cases should be made with Edward B. Bell, Textile Aniline & Chem. Co., 49 Blanchard St., Lawrence, Mass.

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Western New England Section Meeting

A meeting of the Western New England Section was held on March 10, 1950 at Di Orio's Restaurant, Waterbury, Connecticut. Approximately fifty members and guests heard Dr. George L. Royer of the Calco Chemical Division, American Cyanamid Company talk on "Scientific Aspects of Dyeing and Finishing". Dr. Royer's talk, which was illustrated with colored slides, demonstrated how microscopy and spectrophotometry have been applied to the study of dyeing and finishing.

In addition to Dr. Royer's talk a moving picture, "Textiles Unlimited" by the General Electric Company, was shown.

Respectfully submitted,
A. S. Nyquist, *Secretary*

THE DETERGENCY COMPARATOR

CLARENCE L. NUTTING

Chairman, Committee on Evaluation of Detergents for Wool

THE Detergency Comparator developed by the Wool Detergency Committee has now been turned over to the General Research Committee. The particular machine at present in the possession of Dr. H. W. Stiegler at Lowell Textile Institute has been found satisfactory for evaluating detergents used in the usual finishing processes employed in manufacturing wool fabrics.

The Committee does not prescribe any particular procedure for using the Comparator but believes it is versatile enough so that practically any manufacturing conditions can be simulated. Temperatures, speeds, roll pressures, concentrations, etc., can be varied as desired over wide ranges and the type of textile material is not limited. It is believed that the versatility of the Comparator will be demonstrated by the staff at Lowell as time goes on. Because of the great variety of conditions under which detergents are employed, the Committee can not prescribe a standard procedure as it is felt that no one procedure ever will meet requirements.

The selection of an artificial soil is extremely difficult because it is felt that no one artificial soil will satisfy all requirements. This is true because of the great diversity of plant conditions and differences in kind of soil to be removed by detergents in practice. It is believed that no fewer than three types must be considered as representing actual conditions in the average wool processing plant: (1) a soil based on all mineral oil, (2) a soil based on all fatty oil such as olive oil and (3) a soil based on a 50-50 blend of mineral and fatty oils. Suspensions of lampblack in the three respective types of oil were used and in the preliminary test work the Comparator was found to be satisfactorily effective on all three types of soil.

The Comparator has been tried in a mill laboratory and from a large number of tests a tentative procedure has been found which has resulted in a satisfactory evaluation of some detergents with respect to the particular conditions peculiar to the mill. These results have also been duplicated by actual plant trials of the respective detergents. This procedure is offered as a suggested method of using the Comparator.

The Detergency Comparator was developed by the A.A.T.C.C. Research Committee on Evaluation of Detergents for Wool.

The Comparator is similar to a miniature dolly washer and was developed from an earlier model made by B. A. Ryberg under the auspices of this committee. The final model was arrived at through painstaking experimental study, particularly by Clarence Nutting, Hugh Christison and Dr. Madeleine B. Campbell at the Arlington Mills Division of the William Whitman Company. The committee, the special task force (1), and the Riggs & Lombard Company are to be commended for making available a useful instrument for evaluating detergents in relation to actual mill results.

The committee believes the Comparator is the only device that will satisfactorily evaluate detergents under the conditions of high concentration and low bath ratio existing in good plant practice.

Indications are that the Comparator may have equal success when used for cellulosic textiles. This investigation is being pursued by V. B. Holland, Chairman of the Committee on Evaluation of Detergents for Cotton and Rayon.—H.W.S.

An artificial soil was used consisting of an oil blend with lampblack suspended in it. The oil blend was composed of 50% by weight commercial grease oil, and 50% of the solvent refined mineral oil approved for worsted lubrication by the National Top Manufacturers' Association. To 1 gallon of the oil blend was added ½ lb. of Bear Brand Germantown Lamp Black (Monsanto). The mixture of oil and lampblack was applied to worsted top sliver during the first drawing operation in an amount such as to deposit 5.0 to 5.5% oil on the stock. The worsted stock was then drawn and spun to 2/40s count.

It was found that a knitted tubing from 2 ends of this yarn knitted on a 1¾" 53 needle, 18 gauge machine was very convenient as it provided samples approximately 2 yds. in length weighing 40 grams. The tubing was threaded into the machine and the two ends were sewn together enclosing within the tubing a 1" stainless steel ball just ahead of the ⅜" pot-eye. The ball was found to be the best device for opening the tubing so that permanent creases did not occur during the washing run. During the running of the sample the ball is pulled up against the pot-eye in such a manner that the tubing is pulled over it and thereby opened out smoothly just before entering the pot-eye ahead of the squeeze rolls.

A bath ratio of 4 to 1 was used or 160 ml. of distilled water per 40 gms. of soiled sample. Detergent quantity was 4% on the weight of soiled sample in the case of the base type. Quantities of other detergents used were computed on an equal money basis. Temperature of bath and rinse water was 85-90°F. The top rolls were loaded by 40 lbs. of the 60 lbs. of weights provided. The full 60 lbs. were found to be no more effective.

The suds box drain was arranged at the start to deliver into the raised main drain pipe and the machine was started with just the dry sample sewn in. The 160 ml. bath containing the detergent was slowly applied directly to the soiled sample. After all the bath had been added the machine was kept running for a 30 minute period or a period of time which would permit 100 nips or passes through the squeeze rolls. During this washing period a rinse charge of 8 liters of distilled water at 90°F. was placed in the rinse water reservoir, 4 liters for each of the two tubs containing the samples under comparison. At the conclusion of the wash period the rinse water valve was opened allowing the water to pass through the ⅛" metering orifices and enter the respective tubs.

With the upper and lower drains still joined, as during the wash period, the bath volume gradually increased until reaching such a level that over-flow from the main tub drain started. The drains were then separated and arranged so that the suds box drain discharged to waste and the main tub drain was lowered to the 2½ mark on the drain gauge. A total time of 10 to 12 minutes was required to exhaust the supply of rinse water. At that time the tub drain was lowered to completely drain the tub. The run was completed when all water had drained to waste.

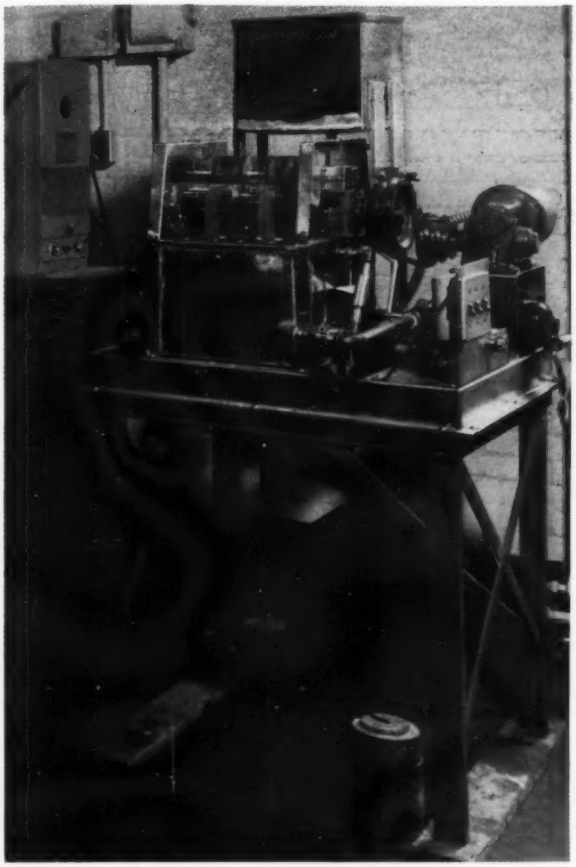


FIGURE 1
DETERGENCY COMPARATOR, FRONT VIEW

The Detergency Comparator is essentially a pair of dolly washers scaled down to laboratory size. It is constructed of stainless steel, has thermostatically controlled electrically heated outer water bath which may be circulated by means of an electric pump to further insure close temperature control, stepped pulleys for speed selection, Hy-car covered nip rolls (3" dia.), driven take-off rolls, baffles to prevent suds from cross contaminating the detergent solutions under test, suds boxes with piping arrangements which permit the expressed liquor to be returned to the main washing tank either by cascading or by passing through the pipe drains or to be drained off into the waste line, adjustable pot eyes to help prevent the formation of hard creases in the running samples and a reservoir fitted with calipered openings and a valve for close control of the rinsing process.

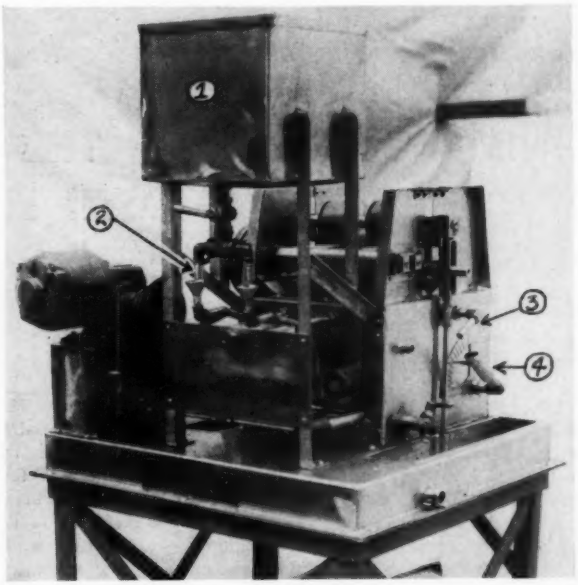


FIGURE 2
DETERGENCY COMPARATOR, REAR VIEW

1. **Rinse Water Reservoir**
2. **Rinse Water Equalizing Orifices**
3. **Suds Box Drain (Adjustable to Waste or to Wash Box)**
4. **Wash Box Drain (Adjustable)**

By this procedure rinsing progresses in two stages: first, by dilution until the drains are lowered, and thereafter, more or less by displacement of the soil bearing bath by the clean rinse water, since the dirty effluent squeezed from the sample goes directly to waste through the suds box drain. This method of rinsing appears to produce the maximum cleansing with a minimum of soil redeposition.

Many modifications of conditions will undoubtedly come to mind. There may be a preference for a woven fabric sample rather than one of knitted tubing. Some trials were made which indicate that a sewn tube of comparable dimensions with the seam turned inside and enclosing the steel ball can be used. However, no method of applying an artificial soil to a woven fabric is known which gives as even distribution of the above artificial soil as is obtainable by the application of the soil to top prior to the drawing and spinning of a worsted yarn.

The Committee feels that the Detergency Comparator is a useful tool that will undergo development and improvement through experience *(2)* to find its place along with the Launder-Ometer and Fade-Ometer in textile laboratories.

It is the only device that will compare detergents under the conditions of high concentration and low bath ratio that compare with the conditions which obtain in good plant practice. Few persons realized these conditions and their significance until the work of testing the Comparator was undertaken. It was found that only when these conditions were met were the results from the Comparator reproducible in the plant.

Credit is due to Dr. Madeleine B. Campbell for the development of the above procedure which simulates the use and performance of detergents in the cloth finishing operations at the Arlington Mills Division of the William Whitman Company.

A model of the Comparator is available for inspection and trial at the National Headquarters Laboratories of the A.A.T.C.C. at the Lowell Textile Institute, Lowell, Massachusetts.

The Comparator may be ordered directly from Riggs & Lombard Company, 750 Suffolk Street, Lowell, Massachusetts, at a cost of $1,570.00.

References

(1) Special Task Force: H. Christison, L. Christison, J. N. Dalton, R. E. Derby, H. W. Leitch, A. Morrison, F. A. Prisley, W. von Bergen.

(2) The Detergency Comparator was used in the New England Section work for the 1947 A.A.T.C.C. Intersectional Contest Paper which is published in the American Dyestuff Reporter, Feb. 24, 1947, P91, Vol. 36, No. 4, "A Study in Detergency".

Auxiliaries and Testing Group Meeting—

IMPROVEMENT OF THE RESISTANCE OF COTTON CLOTH TO SOILING*

WILLIAM P. UTERMOHLEN, JR.**
Institute of Textile Technology, Charlottesville, Va.

Experience and technique gained in research work at the Institute of Textile Technology in the field of cotton detergency have been applied since the middle of 1948 to the problem of treating cotton cloth so as to confer upon it superior resistance to soiling or superior ability to be cleaned by a washing process. The program on this problem has been sponsored by the Research and Marketing Act Administration of the U. S. Department of Agriculture. Among the treatments which have been applied to cotton cloth for this purpose are the following: various amounts of moisture; various amounts of starch; cationic and anionic softening agents; durable and nondurable hydrophobic finishes; prepolymerized vinyl-emulsion polymers; urea-formaldehyde condensates polymerized in the cloth; and several treatments, such as partial acetylation, producing chemical alterations in the cotton cellulose. Cloths so treated have been soiled with several kinds of pigment, from liquid dispersions or in a dry state, and washed.

The effects of these various treatments upon the ease of soiling and of soil removal are presented and briefly discussed.

RESEARCH in detergency at the Institute of Textile Technology was initiated in 1946 to review and improve the methods of laboratory detergency research, and to make textile detergency phenomena better understood. This work accomplished its purpose in that it resulted in new knowledge of the relation of apparent soiling and cleaning to the true soil content, in improvements in methods of soiling and storing cloth for detergency work, and in improvements in measurement of the extent of soil removal produced by washing. Experience and technique acquired in this work have been applied since the middle of 1948 to a very important practical problem: the treatment of cotton cloth so as to confer upon it superior resistance to soiling or superior ability to be cleaned by a washing process. The objective of this paper is to present a brief review of the background of this problem and a preliminary account of the qualitative results obtained during the first year of work on it.

The problem of improving the resistance of cotton cloth to soiling was first formally presented in October 1947 by the National Cotton Council in its booklet *Cotton Research Proposals,* which discussed cotton problems upon which research was needed. Under the heading "Resistance of yarns and fabrics to soiling", it was pointed out that cotton fabrics, although extremely launderable, had applications in which effective laundering could only be done infrequently or with great difficulty, and that the utilization of cotton could be extended by improving the soiling resistance of cotton textiles. The approach to this problem recommended in the booklet to be tried first was the application of resin finishes to the yarns and fabrics; the purpose of such finishes was considered to be to fill up the little crevices in cotton fibers and yarns which could retain soil most readily.

The resistance of cotton to soil would be especially valuable when there was no time for laundering or when no laundry facilities existed, when the article is bulky or fastened down, and in many household and apparel uses. The Bureau of Agricultural and Industrial Chemistry representatives pointed out that cotton garments were thought to soil appreciably more readily than similar ones made from rayon. If cotton could be made more resistant to soiling in end use, its competitive position in the textile industry should be capable of material improvement.

Before experimental work was begun, a number of hypothetical means of solution of the problem were postulated, either by the National Cotton Council, the Bureau of Agricultural and Industrial Chemistry representatives, or the Institute research group. These may be divided into methods which are principally physical or chiefly chemical. The physical methods included the following: making surfaces smoother with fewer crevices, as by application of mercerization, resin coatings, or cellulose-base finishes; making fabrics more wrinkle-resistant, or better able to recover from wrinkling; and employing various constructions of yarns and fabrics. The chemical methods included reduction of electrical attraction, if any, between cotton cloth and soil particles; alteration of the moisture relationships of fabrics, as by applying hydrophobic finishes or by altering the moisture regain equilibrium values of cotton cellulose; and reduction of the number or intensity of soil-holding sites, as by blocking the cellulose hydroxyl groups to reduce hydrogen bonding. The effect of improvement of resistance of wrinkling was thought pertinent to this problem because wrinkling or mussing of a piece of cloth is popularly associated with cloth soiling.

Practical aspects of any treatments to be applied must also be considered. Successful treatments should not alter the desirable properties of cotton so that its applicability is lost (e.g., by tendering and strength loss, reduction of moisture adsorption). Also, a treatment which enhanced resistance to soiling, but at the same time decreased the ease of soil removal, would probably be unsatisfactory, since laundering is already enough of a problem without being made more difficult.

All of the work done to date has been limited to cotton 80-square kiered and bleached sheeting, and to visible (pigment) soiling. The reasons for the latter restriction are that visible pigment soil is the most objectionable kind, is generally the most difficult to remove, and is the easiest to estimate. Most of the soiling work has been done in the traditional fashion by

* A report of work done under contract with the U. S. Department of Agriculture and authorized by the Research and Marketing Act. The contract is being supervised by the Southern Regional Research Laboratory of the Bureau of Agricultural and Industrial Chemistry. Presented at Auxiliaries and Testing Groups Meeting, Atlantic City Convention, October 14, 1949.

** Present Address: The Permutit Company, Birmingham, New Jersey.

padding black pigments, with or without oil, from a liquid dispersion (CCl_4 and water, mostly). This general method has the advantages of familiarity, usage by detergent manufacturers for product evaluation, and a fair degree of reproducibility; but it also has the difficulties that various soiled test cloths may not behave consistently in soil removal by various detergents, and that the procedure is *not* like those by which most end-use soil is acquired.

A *natural soil* could also be selected and applied by the padding method, or in a fashion typical of end use. Such a soil and procedure have obvious advantages, although natural soils lack the constant qualities of commercial artificial pigments.

The usual laboratory methods of producing soiled cloth have been by the use of (a) pigment and oils dispersed in carbon tetrachloride or a hydrocarbon (most used), (b) pigment and oils dispersed in water, and (c) dry pigment soil (least used). Corresponding end-use sources of textile soiling include (a) automobile grease, paint, and some foods; (b) mud, muddy water, many foods, wiping hands on towels; and (c) dust, soot, street and garden dirt. Sources (b) and (c) of the end-use list above are the most frequent, but do *not* correspond to the type (a) most used in laboratory work. This situation is of greater concern in the problem under consideration than it is in the field of testing and evaluating detergents.

Washing of treated and soiled pieces of cotton cloth was done in a standard Launder-Ometer, with detergents and washing conditions selected to represent typical domestic and commercial laundering practice. This selection, although necessary, was admittedly arbitrary in view of the many varied types of fabrics and soils with which the average home or commercial washer must contend. As mentioned previously, the determination of the effect of a given cloth treatment upon the ease of removal of soil from the cloth was considered of equal necessity to the determination of its effect upon the ease of soil acquisition.

In domestic and commercial laundering, if washed clothes look clean and smell clean, they *are* clean; *appearance* and not soil content is the principal standard by which such laundering is judged. Almost all of the evaluation in this work has therefore been done by means of reflectance measurements. Comparisons of ease of soil removal have been made only on pieces whose reflectance values before washing were equal. This does *not* mean that the pigment soil contents before washing were equal, or that two pieces of washed cloth with equal reflectances had equal soil contents.

Among the treatments which have been applied to cotton cloth are the following: various amounts of moisture; various amounts of starch; cationic and anionic softening agents; durable and nondurable hydrophobic finishes; prepolymerized vinyl-emulsion polymers; urea-formaldehyde condensates polymerized in the cloth; and treatments such as partial acetylation or partial carboxymethylation producing chemical alterations in the cotton cellulose. The effect of these upon *liquid*-dispersed soils has been studied for both CCl_4 and aqueous pigment dispersions, and will be discussed first.

Variations in relative humidity of the laboratory air, from 35% to 85%, had no significant effect on the ease of soiling of liquid-dispersed soils, or on the ease of removal of such soil. Oven-dried cloth soiled more heavily than damp cloth (75 per cent moisture content), however, and retained the soil more tenaciously upon washing. Thus in one experiment pieces of dry and damp cloth upon equal exposure to the same soiling bath emerged with reflectance values of 24 and of 40 per cent, respectively. In one of the subsequent experiments, similar pieces of cloth were soiled to the same initial reflectance of 33 per cent (accomplished by using a much more concentrated soiling dispersion for the damp than for the dry cloth), and were given equivalent washings; the dry-soiled cloth then had a reflectance of 62 per cent, while the damp-soiled cloth had risen to 74 per cent reflectance. For the comparative washing tests with other treated pieces of cloth, this same principle was followed; suitable various concentrations of soil in the padding baths were used to produce soiled swatches of both treated and untreated cloths of equal initial reflectance. As pointed out above, this did *not* necessarily mean equal soil contents, since pigment flocculation was noted in some cases.

Damp cloth appears to resist soiling because the water already present prevents displacement by the soil-carrying liquid, even when the latter is water, except for long exposure times. It probably washes cleaner than dry cloth because the pigment dirt does not have as good a chance to become adsorbed or to penetrate the fabric surface.

Starched cloth soiled more heavily than unstarched cloth from CCl_4 dispersions, especially with higher concentrations of starch. Starch did not alter the apparent soiling from aqueous dispersions. Small amounts of starch had little effect on apparent soil removal; larger amounts generally aided it, except with certain tested synthetic (nonsoap) detergents.

A number of the cationic and anionic softeners now on the market were used to treat the cotton cloth, since they are easy to apply, do not make the cloth stiff, and are substantive in that they remain on the cloth to the extent of about one per cent after laundering. These two types of materials would also be expected to confer electrical charges of opposite sign upon treated cloths. The most noticeable effect from the use of the softeners was increased ease of removal of soil deposited from aqueous dispersions except in certain cases when a synthetic detergent was used. The anionic softeners had a generally favorable effect upon soil resistance, as well.

Durable and nondurable hydrophobic finishes produced a nearly complete resistance to aqueous soil, of course, and also a substantial resistance to soiling from CCl_4 dispersions. Washing the treated cloths soiled from CCl_4 dispersions of lampblack gave rather interesting results in that the soil on cloths treated with two durable water repellants (Norane, Dow-Corning 1107), which are not removed by one laundering, was quite poorly removed by washing. On the other hand, the soil on cloths treated with two nondurable wax-type water repellents, which wash out during laundering, was removed about as well as in the untreated cloth. This unexpected retention of soil by pieces of cloth treated with durable hydrophobic finishes was also observed with a black iron oxide soil, for which both analysis and optical measurements could be made. It is thought possible in these cases that the soil was originally deposited on the hydrophobic cloth in an agglomerated form, and that the washing first dispersed this dirt and then redeposited much of it. Such a process would increase the blackening power of the pigment by increasing its degree of subdivision.

A number of the recently marketed textile finishing resins, neutral polymers or copolymers of the vinyl type in emulsion form, have also been applied to cloth before soiling. The effect of a water-soluble resin of the sodium polyacrylate type has also been studied. Cloths treated with the various neutral resins behaved toward CCl_4 soiling as did the durable hydrophobic finishes—resisted soiling somewhat, but held the soil more tenaciously upon washing. Water-dispersed soil was also held tightly. Cloth treatment with the resin containing carboxylate groupings, however, aided soil removal, particularly in respect to soil deposited from aqueous dispersion.

Two of the well-known textile crease-resistant finishes of the urea-formaldehyde type have been tried. These did not produce any resistance to soiling, and made the acquired soil more difficult than normal to remove. This tentative conclusion is being tested using other similar products.

The final group of textile finishes that has been studied includes some of those

TABLE I

Treatments which made cloth more resistant to dry soiling than the untreated cloth.	Majority of softeners Polycarboxylic resin Mercerization Partial carboxymethylation Partial acetylation
Treatments producing no definite effect.	Starch (5%) Some softeners Some resins (chiefly condensation type)
Treatments which made cloth less resistant to dry soiling than the untreated cloth.	Nondurable and durable hydrophobic finishes Most resins (especially vinyl type)

worked on at the U. S. Southern Regional Research Laboratory. These alter cotton cellulose chemically—mercerization, partial acetylation, carboxymethylation, and aminoethylation. The use of such finishes is attractive in that little or no undesirable change in appearance, hand, or other physical properties of the cotton fabric is produced. The Southern Regional Laboratory furnished the samples that were tested in this work. All of these except aminoethylation showed some promise, the desirable effect being more noticeable on soil removal than on resistance to soiling. The partial-carboxymethylation treatment produced the most noticeable all-round improvement; this is of interest in connection with the favorable effects produced by treatment with the polyacrylate resin containing similar carboxyl groups.

To summarize this part of the work, a number of the treatments tried *have* produced some resistance to soiling from CCl_4 or water dispersions. Some of these, however, have had the effect of making the soil *more* difficult to remove, and thus appear to be unsuitable (these include neutral vinyl resins, urea-formaldehyde resins and durable hydrophobic finishes). Others which enhanced the ease of soil removal also made soil acquisition more easy, and thus are also unsatisfactory (starch, some resins, cationic softeners). The most promising treatments for these liquid-dispersed soils appeared to be anionic softeners, partial carboxymethylation, and treatment with a vinyl resin bearing carboxyl groups. Some of these, however, might not be expected to remain on the cloth after several launderings.

After most of this work with liquid-dispersed soils had been done, the relative value of studies with *dry* soils became increasingly apparent. This type of soil is extremely important in end use, but has been little used in laboratory work because of various experimental difficulties and because most of this work has been on detergent evaluation, for which soils dispersed in liquids have been considered adequate. In this problem, however, the most important type of resistance to soil is resistance to *dry* soil, and investigations along this line were therefore begun.

The method used for dry-soil testing has been to tumble treated and untreated swatches, rubber stoppers, and dry pigment together in a dynamic-water-absorption-apparatus jar. The soiled pieces then have been shaken in a sieve and gently brushed, and the reflectance values measured with a photometer. Lampblack, as an *artificial* soil, and sifted screened vacuum sweeper dirt from a theater, as a representative *natural* soil, have been used as soiling pigments. For test pieces, swatches treated as described previously were used.

This test method gave quite noticeable differences in the extent of visual soiling for both the above types of dry soil. The greatest resistance to soiling was produced by partial acetylation. At the other end of the scale, swatches treated with neutral vinyl polymers or with hydrophobic finishes came out very dark. The qualitative rankings of the various treatments tried to date are shown in Table I.

It appears that a rough correlation exists between the resistance to liquid-dispersed soils and the resistance to dry soils produced by the various treatments. For both types of soil, treatments which confer cation-exchange properties upon the cotton cellulose appear of especial interest. More work on these points will be necessary before conclusive answers can be reached. No washing tests have been run yet on the dry-soiled swatches.

It is apparent that the work done so far on this problem represents only a beginning. Other methods of soiling and treating fabrics should be tried out on a range of materials. This work is being continued at the Institute of Textile Technology.

It should be emphasized again that such a research objective has practical limitations. The wide variety of fabrics, fabric uses, and soils makes the finding of any one treatment that would produce resistance to many soils for a wide variety of uses unlikely. Many of the present desirable properties of cotton—moisture absorption, stability to weathering and to alkaline conditions, launderability, wet and dry tensile strengths—must be retained after a soil-resistant treatment, at least for certain uses.

Summary

The effect of a number of treatments upon the ease of soil acquisition by cotton cloth and upon the ease of soil removal from the soiled cloth by washing has been studied. Of the treatments employed, those which alter the electrical charge upon the cloth by introducing acidic groups appeared to have the most favorable general effect in increasing soiling resistance and ease of soil removal. Partial acetylation was particularly effective in increasing resistance to dry soiling.

CALENDAR

COUNCIL

Meetings: June 9 (Montreal, Que.) Sept. 28-30 (Portsmouth, N. H. Convention) Nov. 17 (New York).

NATIONAL CONVENTIONS

1950: September 28 to 30, Portsmouth, N. H.
1951: October 18 to 20, Statler, New York
1952: Boston.

LOWELL TEXTILE INSTITUTE STUDENT CHAPTER

Banquet: April 21 (at the Institute).

MID-WEST SECTION

Meeting: May 6 (Schroeder Hotel, Milwaukee, Wisc.), June 17—Annual Outing—Lake Lawn Lodge, Delavan, Wisc., October 28—Chicago, Ill.

NEW YORK SECTION

Meetings: May 5 (Kohler's Swiss Chalet, Rochelle Park, N. J.), June 16—Outing.

NORTHERN NEW ENGLAND SECTION

Banquet: April 21 (Lowell Textile Institute), Meeting: May 19 (Merrimac C. C., Methuen, Mass.).

PACIFIC SOUTHWEST SECTION

Meeting: April 28 (Los Angeles Athletic Club).

PHILADELPHIA SECTION

Meetings: May 5 (Kugler's, Philadelphia), June 9 (Annual Outing, Torresdale-Frankford Country Club, Philadelphia), October 13, December 8, January 17, 1951.

PHILADELPHIA TEXTILE INSTITUTE STUDENT CHAPTER

Meetings: April 26 and May 24.

PIEDMONT SECTION

Meetings: June 30-July 1 (Ocean Forest Hotel, Myrtle Beach, S. C.), October 28 (Charlotte, N. C.)

RESEARCH COMMITTEE

Meetings: June 9 (Montreal, Que.), Sept. (Portsmouth, N. H., Convention), Nov. 17 (New York).

RHODE ISLAND SECTION

Meetings: April 28 (Providence Engineering Society Hall) May 26 (Johnson's Commodore Room, Providence, R. I.) October 27 (Providence Engineering Society Hall) November 17 (Johnson's Commodore Room).

SOUTH CENTRAL SECTION

Meetings: May 20 (Hotel Patten, Chattanooga, Tenn.) August 18-19 (Summer Outing—Read House—Hotel Patten, Chattanooga Country Club—Chattanooga, Tenn.).

SOUTHEASTERN SECTION

Meetings: May 27 (Columbus, Ga.), Sept 23 (LaGrange, Ga.) Dec. 9 (Atlanta, Ga.).

WESTERN NEW ENGLAND SECTION

Meetings: May 26 (Waverly Inn, Cheshire, Conn.) June 23 (Outing at Wallingford, Conn. Country Club).

ABSTRACTS

Package and Piece Goods Dyeing with Pigment Colors

H. A. Thomas, Textile J. Australia 24, 814-18, 827, Nov. 1949. (from Canadian Textile J.).

"Pigment coloration can be defined as the application of a water-insoluble organic or inorganic pigment which itself has no affinity for the textile fiber and, therefore, has to be applied in conjunction with a binding medium. The final state of the pigment colored textile is, therefore, an attachment of a pigmented binding medium to the fiber rather than a dispersion of dyestuff or pigment particles throughout the fine molecular structure of the fiber, such as is obtained in a dyeing process."

The author first refers to the vat pigment padding process, but points out that this is not truly "pigment coloration", since the dye is subsequently reduced. He states that pigments may be applied in four ways, as follows:

A. In water-in-oil emulsions.

B. In oil-in-water emulsions.

C. In organic solvents.

D. In synthetic resin lacquers.

The Aridye process is based on method A, or rather, a combination of A and D. The pigment binder comprises an oil-modified alkyd resin, together with dimethylol urea. The emulsion is padded on the fabric, followed by drying and baking at 140-150°C. A more recent development is the use of alkyds modified with ammonia or triethanolamine, resulting in a mixture soluble in water.

Method C involves the use of thermosetting resins dissolved in mixed solvents, but these processes are expensive and require a solvent recovery plant.

Among the advantages of pigment dyeing the author lists high speed of production, solid shades on two or more fibers in the same fabric, and the ability to color fibers which have little affinity for dyes, such as Fiber A and glass.—W.H.C.

Non-woven or Bonded Fabrics

J. Bromley and G. H. Elliot, Textile J. Australia 24, 892-900, Dec., 1949. (from Textile Recorder).

Bonded or non-woven fabrics made from fibrous webs of rayon and cotton without spinning or weaving have made steady progress during the last three years. Today in the United States seven or more companies are engaged in their production, manufacturing more than 50,000,000 square yards per annum.

Several difficult methods of manufacture are employed. In one method, the binding of the web is accomplished by printing stripes of adhesive which penetrate and hold the web together locally. In another method, modified cellulose acetate or other thermoplastic fibers are blended together with non-thermoplastic ones (e.g., viscose or cotton) and hot calendered. A third method parchmentizes webs of cotton and viscose by means of treatment with sulfuric acid.

The authors list eight different American non-woven productions in common use, all manufactured on textile machinery. These fabrics vary considerably in strength, handle, porosity, price, etc.; nearly all are less than 4 oz. per sq. yd. in weight.

While the characteristics of bonded fabrics can be varied widely by changes in the fibers and binding agents employed, further modification may be made by finishing treatments (e.g., by dyeing, printing, coating with resins, waterproofing, fireproofing, embossing, etc.)

The most promising fields of employment for these fabrics appear to be leathercloth manufacture; tapes; filters for oil, milk, paints, etc.; abrasive fabrics; bags for flour, etc.; plastic laminates; adhesive bandages; oil-cloth; electric insulation; and artificial suede. Many other uses are also mentioned, and reference is made to various British patents.—W.H.C.

Textile Trade Effluents and Their Treatment

W. P. Hazeldine and L. Klein, J. Textile Institute 40, P1090-1106, Dec., 1949.

The construction of a trade waste purification plant should be undertaken only as a last resort. It is necessary to install automatic flow recorders, in order to keep track of the fluctuating flow during the day. The location of the plant is of considerable importance, and various suggestions are given. Mr. Hazeldine describes the various types of settling tanks, and the proper disposition of the resultant sludge.

Untreated effluents from mills are likely to contain large amounts of acids and alkalis which are injurious to fish. Organic matter is detrimental because it tends to deplete the water of its dissolved oxygen. Fermentable matter will lead to objectionable odors. Toxic substances in the effluent may include lead, copper, chromium, and cyanide compounds, among others. There are also likely to be suspended solids, oil and grease, and various colored substances, all objectionable when discharged into a stream.

An ideal trade effluent, after treatment, should be clear, colorless, odorless, neutral, non-toxic, low in organic matter, and free from oil, suspended matter, and excessive mineral salts. No known method of purification will produce such an effluent, but Dr. Klein describes the general methods for treating textile wastes, including physical, chemical, and biological methods. The effluents from wool scouring, cotton mercerizing, kier boils, cotton dyeing, bleaching, and printing, and viscose rayon manufacture are all discussed in detail.—W.H.C.

Rotproofing

H. W. Partridge and G. E. Key, J. Textile Institute 40, P1077-89, Dec., 1949.

The protection of textile materials against the attack of microorganisms has become important in recent years, particularly in connection with military equipment to be used in the tropics. The organisms concerned fall into two classes: the molds and fungi (e.g., *Aspergilli, Chaetomium, Penicillia)* and the bacteria. Attack is in all cases favored by warmth and moisture, and increased if the fabric contains starches, gums, etc. Hence the first step in the production of rotproofed textiles is to scour out any such substances, and to avoid the introduction of finishing materials of like nature.

The ideal rotproofing agent should be both fungicidal and bactericidal. It should have no objectionable odor, should be nontoxic to humans, and should not tender the fabric. It should preferably be colorless and have no effect on the shade or hand of the finished goods. The use of tar, creosote, etc., for this purpose is objectionable as regards both hand and smell, though it has been quite common in the past.

The Willesden process (treatment of cotton with a cuprammonium solution) results in the absorption of sufficient copper to produce a substantially rotproof effect. A more efficient treatment is the use of copper naphthenate, since naphthenic acid is of itself toxic to microorganisms. Zinc naphthenate is also used where the green color of the copper is objectionable.

On wool, chrome mordanting gives adequate rotproofing if the chromium content is not less than 0.35%. Cotton material may also be rotproofed by impregnation in basic chromium sulfate followed by treatment with an alkali.

Shirlan (salicyl anilide) is an excellent

mildew-proofing agent but is not suitable for rotproofing since it is easily leached out of the goods. Various other aromatic compounds, largely derivatives of phenol or cresol, have been recommended, but most of them have the same defect. It has now been found that many of the phenolic rotproofing compounds can be made more resistant to leaching, either hot or cold, by reacting with a certain class of quaternary ammonium compounds, which, incidentally, also possess fungicidal properties. This technique is described in some detail.

To test the efficiency of rotproofing processes, soil burial is recommended, also inoculation with fungi, followed by incubation. Details of both methods are given.—W.H.C.

The Effect of Physical Pre-Treatment on the Ease of Saponification of Cellulose Acetate Material

C. P. Tattersfield, J. Soc. Dyers & Colourists 66, 9-13, Jan., 1950.

It had already been observed that if pressure is applied locally to an acetate fabric, that portion of the fabric saponifies more readily than the rest when caustic soda is used as the saponifying agent.

The author has investigated this phenomenon further on an acetate satin, by applying either pressure (rubbing the surface with a smooth glass rod or hammering with a typewriter key), abrasion (with an eraser or sandpaper), or stretching. In all of these treatments, the treated portion later saponified more completely than the untreated, as shown by subsequent dyeing with direct dyes. He found that the effect was produced by saponifiying with either caustic soda or caustic potash, but not with soda ash. He also found that if the fabric, after applying pressure, etc., is given a hot wash before saponification, the effect is lost.

He suggests that this phenomenon may be utilized in at least two ways:

1. As a test to show whether a fabric has been subjected to physical strain.

2. To produce two-tone effects in an acetate fabric by passing between embossing rollers (or between plain rollers in contact with a fabric with a conspicuous weave, the weave being thereby impressed onto the acetate fabric), and after saponifying, dyeing with selected direct dyes.—W.H.C.

Some Replica Techniques Useful in Electron Microscopy of the Surface of the Wool Fiber

K. R. Makinson, Textile Research J. 20, 22-8, Jan., 1950.

Techniques have been developed for making replicas, suitable for examination in the electron microscope, of the surface of the wool fiber without subjecting the fiber to heat or pressure. Electron micrographs are reproduced to illustrate the appearance of normal wool fibers and of fibers subjected to various chemical and mechanical treatments. The results obtained support the view that the scales consist of a smooth layer overlying a more resistant furrowed structure. Certain other features of the scales, including a peculiar "fringed" edge, are also noted.—W.H.C.

Flame Retarding of Textiles (Symposium)

Introduction

G. J. Esselen, Ind. Eng. Chem. 42, 414, March, 1950.

There are two types of flame-retarding finishes, transient (readily removed by washing) and permanent. Other factors of importance are wear resistance, draping properties, and cost. In 25 states and in many cities there is now legislation relating to flammable or combustible fabrics. "The textile industry has a double responsibility: first, to see that the public is not subjected to unduly hazardous or dangerous textile fabrics; secondly, to see that regulations and restrictions on combustible textiles do not drastically curtail commerce in textiles that have been used with satisfaction and safety for generations."—W.H.C.

Thermal Behavior of Fabrics at Flaming Temperatures

S. Coppick, J. M. Church, and R. W. Little, Ibid., 415-18.

The protective quality of a fabric may be defined, from a thermodynamic viewpoint, as a function of the quantity and intensity of the heat supplied and generated, the area over which it is effective, and the coefficient of heat transfer. Damage or injury to personnel results from the calorific transfer through and propagation along the fabric. Tests show that because their thermal conductivity is similar, cellulose fabrics which are adequately flameproofed and glow-retarded have thermal protection qualities equal to fabrics made from the most inert fibers.—W.H.C.

Evaluation of Flame-Resistant Fabrics

J. M. Church, R. W. Little, and S. Coppick. Ibid., 418-27.

The acceptability of any flameproofed fabric for a given purpose is dependent not only upon its flame resistance, but also upon other textile characteristics which may be altered by the flameproofing treatment employed. The type of flame-retardant chemical and the conditions used for its incorporation within the fabric not only affect the characteristics of the finished cloth, but also restrict its use for certain applications. The flammability of a fabric is a factor of the combustibility of fiber, type and weight of weave and effectiveness of any added flame-resistant treatment. The determination of the flame resistance of fabrics has recently been investigated by many laboratories. During the war an intensive study of this problem was made, the results of which have led to a standardization of flame test methods for a wider acceptance and better agreement between laboratories. Uniform and consistent results have been obtained by the establishment of rigid procedures for flame tests, which now make it possible to measure the comparative effectiveness of various flame-resistant treatments and determine the relative value of flame-resistant fabrics for any given purpose. Consideration has been given to not only the extent of flaming produced in the combustion of the fabric but also the rate of burning and the duration of the afterglow, employing the vertical, horizontal, and angle tests. Other methods for testing the acceptability of flame-resistant fabrics include durability to leaching by tap water, sea water, perspiration, and detergent solutions; deterioration of the fabric or its flame-resistant characteristics in storage or actual use; measurement of fabric strength and porosity; physiological effects of flame-resistant treatments, such as toxicity, skin abrasion, and heat load.

The ideal flameproofing requirements for textiles are listed as follows: minimum effective "add-on" to avoid a poor hand; an easy method of application; reasonable permanency to washing and dry cleaning; no damage to the fiber in storage; no decrease in the air permeability of the fabric; compatibility of the treatment with other finishing treatments; no physiological action on the skin; no propagation of flame and no appreciable afterglow.—W.H.C.

Statutory Requirements for Flame Resistance in Textiles

G. S. Buck, Jr., Ibid., 428-30.

All cellulosic fibers are combustible. The ease with which textile fabrics made from these fibers ignite and their manner of burning differ widely, but the differences are the result of their fabricated form as cloth structure rather than of differences in the combustibility of the fibers themselves. In certain uses, a fabric having any degree of combustibility may be a fire hazard, whereas in other uses only fabrics that burn with unusual rapidity or volume of flame could be considerad potentially dangerous. In order to provide the greatest possible safety against

fires, statutory restrictions upon the use of combustible textiles require flame-resistant properties in some applications and place limitations on the maximum rate of burning in others.

The first attempt to govern the sale of textile fabrics or garments deemed hazardous was made in California in 1945. Several bills were introduced into the U. S. Congress between 1945 and 1949, but only one reached committee hearings, and no action was taken, as no entirely acceptable method of measuring rate of burning reproducibly had been proposed. During the past three years several interlaboratory testing programs have been carried out in an effort to devise a better testing method, and a research fellowship has been established at Lowell Textile Institute under A.A.T.C.C. auspices to make further studies. —W.H.C.

Fire-Retardant Textiles from a Consumer Standpoint

K. H. Barnard, Ibid. 430-2.

The author cites the Coconut Grove disaster in Boston in 1942, the circus tent fire in Hartford in 1944, and the fatal burning of a boy in Washington whose cowboy suit caught fire from a bonfire, as examples of the importance of fire-retardant treatments. He lists a number of requirements which a fabric, in addition to its fire-retardant properties, must possess, and stresses the importance of keeping the cost of the treatment low.—W.H.C.

Commercial Application of Flame-Resistant Finishes

R. W. Little, J. M. Church, and S. Coppick. Ibid., 432-40.

Flame retardants for application to textile fabrics may be subdivided into water-soluble salts and durable finishes, capable of resisting wet- and dry-cleaning operations. The two principal groups of water-soluble salts and mixtures are: those capable of forming thermostable foams of flame temperatures, and the thermolabile inorganic and organic salts of the mineral acids. Durable flame-resistant finishes may be classified as double-bath treatments, dispersions of the emulsion or solvent-suspension type, and modified cellulose processes wherein reaction with the cellulose molecule is obtained. Because the protection afforded by soluble salts is of a transient nature, they are generally applied to fabricated textile items by dipping, spraying and brushing, or by commercial laundry impregnations. Durable or semipermanent finishes are applied in the finishing mill, for the most part on routine padding and drying equipment. Two-bath processes appear to be of increasing interest, despite the careful controls required in plant processing. Although restricted in application because of solvent removal and recovery problems, solvent suspension processes are regularly applied to heavy-weight fabrics. Emulsion formulations lend themselves regularly to plant processing on available mill equipment. The modified cellulose finishes have been successfully adapted to mill operations. Continued improvement of flame-resistant finishes may be expected as a result of current research and development programs.—W.H.C.

Durably Flame-Retarding Cellulosic Materials

H. C. Gulledge and G. R. Seidel, Ibid., 440-4.

This paper describes a new method for durably flame-retarding cellulosic materials such as cotton and viscose. The chemical employed is based on an aqueous titanium-antimony complex known as Erifon flame retardant which, after a two-step process, appears to combine chemically with the cellulose molecule. Methods and problems of application and properties of a variety of treated fabrics are discussed, and limitations as to durability, dyeing, and fields of application are pointed out. Technical aid is necessary before an individual mill can satisfactorily apply this process; several mills are now equipped to operate on a commercial scale.—W.H.C.

• PATENT DIGEST •

PAUL WENGRAF

Water Repellent Fabrics, Stearamides, Mixed with Alkylated Methylolmelamines G, 2, 02

U. S. Pat. 2,491,249
(American Cyanamid, Cathers, Fluck, Jr., Dec. 13, 1949)

This patent refers to U. S. Pat. 2,357,273, 1944, assigned to the same company by Thurston (see below). The older patent comprises the application of a composition of a higher fatty acid amide (stearamide or lauramide) in admixture with an alkylated methylolmelamine. Though this process is said to be very successful, the present method aims to improve it with respect to an increased dispersibility in water obtained by simple agitation with water. It has been observed that concentrated aqueous solutions of alkylated alkylolmelamines are capable of dissolving the forementioned higher amides by merely heating the components to 180°F. or higher. A small amount of ordinary soap or any known dispersing agent, added to this solution, has the effect of dispersing the components in a very fine state upon rapidly cooling, and upon further dilution providing a finishing bath ready for immediate use. The addition of small quantities of ammonia (5-10% of the composition) is suggested in order to improve the storage properties of the finish. The ratio of the single components is given with 15-25% up to 100-150% amide calculated on the amount of the melamine derivative and, preferably, with a proportion of 6-30 p.b. weight stearamide for 20-40 p. methylated methylolmelamine plus 0.6-1.2 p. sodium stearate. The most important discovery is that the amides become highly dispersible in the melamine component in a wide range so that self-dispersing effects are obtained practically in every proportion.

Reference cited by the Patent Office:

U. S. Pat. 2,357,273 (Cyanamid), 1944: high substituted alkylated methylolmelamines combined with higher fatty acid alkylolamides.

Reference is further made to the water repellent process described in U. S. Pat. 2,426,770 (cyanamid)—cf. REPORTER 1948, 244, suggesting the application of ethers of methylolmelamines combined with higher alcohols.

Drying Apparatus for Fabrics in Rope Form C, 6

U. S. Pat. 2,492,574
(Heintzelman, Malick, Dec. 27, 1949)

In dyeing, or otherwise wet processing

fabrics, the spacing rail posts are usually in the form of stationary pins or pegs. The traveling strands are continuously on their way upward in contact with these parts and often become damaged by abrasion or chafing or by displacement of the warp or filling threads. This drawback occurring in winch dyeing machines of the type illustrated in Fig. 1 can easily be prevented, according to the present invention, by replacing the rigid posts with rotatable ones as shown in Fig. 2: two parallel rolls (8 and 8') are fixed in mountings (9) attached to the stationary rod (7). It can be seen by the sectional view on the left hand side of Fig. 2 that rolls (8) and (8') consist of a cylindrical metal portion (13) covered with a surface sleeve (14) to reduce friction between the fabric and the rolls which follow the movement of the material.

References cited by the Patent Office, among others:

U. S. Pat. 2,360,965/1944 (American Sales Book Co.): a strip decollating machine having a plurality of strip separating belts arranged for frictionary engaging with the strips.

U. S. Pat. 2,348,162/1944 (Champion Paper and Fiber Co.): a device for applying lateral tension to a web of paper, comprising two pairs of rollers oppositely mounted and freely swinging on a pivot. The rollers engage the edges of the web, exerting equal forces to stretch it in both directions.

U. S. Pat. 1,867,210/1932 (Cohoe Processes): a dyeing machine characterized by conveyance of the fabric in a container at a lower speed over rolls rotating at a relatively higher speed, thereby causing the fluid to penetrate the fabric or to pass entirely through the material.

Drying Fabrics, Hot Air Blown Through Slits in Different Directions G, 3

U. S. Pat. 2,492,974
(J. Dungler, Jan. 3, 1950)

A fabric (2) to be dried on a tenter frame by hot air is passed, according to the accompanying drawing, between two series of nozzles (1) as shown in Fig. 1. The main innovation consists of blowing the drying gas—generally hot air—through two or more pairs of slits (3 and 4) arranged above and beneath the traveling web. Slits (3) are located at the front part of the nozzles (1), providing an oblique jet, while slits (4) are constructed to blow the stream of hot air in a right angle to the fabrics. Thus the drying air coming from (3) acts in opposite direction to the moving fabric, and the mass of air coming from (4) is carried away by the web in the inverse sense. The hot air, saturated with moisture, is removed by suction through chamber (5) which is

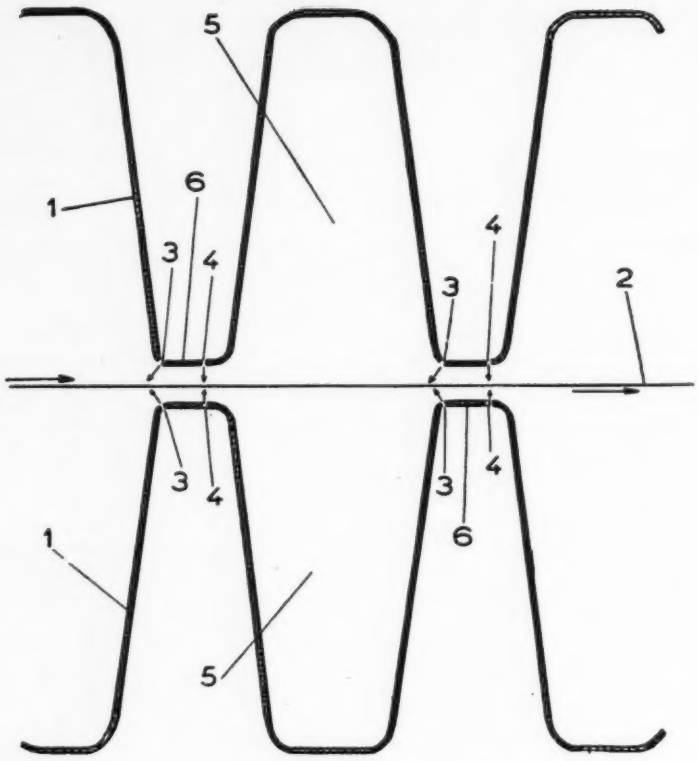


Figure 1

formed by the interval between two adjacent nozzles. A plane view of the device is given in Fig. 2.

References cited by the Patent Office, among others:

U. S. Pat. 2,402,545/1946 (National Steel): a drying apparatus for steel strips, comprising a drying chamber with two partitions, one located above the other. The metal strip to be dried passes between these two partitions.

U. S. Pat. 2,081,945/1937 (Consolidated Water Power and Paper Co.): drying a coated web on a drum under pressure to provide a fluid cushion between web and drum surface to "belly" the web away from the drum, thus avoiding direct contact with the heated surface.

Reference is further made to the type of fabric drying devices patented by Krantz (U. S. Pat. 1,961,881) characterized by the blowing of hot air in transversal direction on different parts of the moving material.

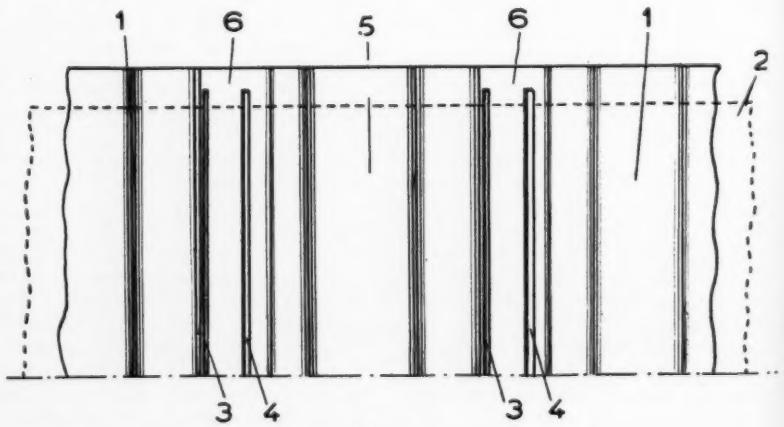


Figure 2

TRADE NOTES • NEW PRODUCTS

Nickerson-Hunter Cotton Colorimeter

• Automatic Colorimeter for Cotton

The automatic Nickerson-Hunter Cotton Colorimeter was developed from performance specifications prepared by Miss Dorothy Nickerson of the Product Marketing Administration of the U. S. Department of Agriculture for an instrument that could be used in the Cotton Classing Room to show automatically, and without manipulation by the operator, the exact color of each sample of cotton brought to it. Richard S. Hunter and Marshall G. Powell of the Henry A. Gardner Laboratory, Inc., Bethesda, Maryland, applied the successful color-measurement methods of the manual Hunter Color and Color Difference Meter* to the automatic measurement of the color of cotton. For cotton colors, Hunter's coordinates "R_d" and "b" are said to provide, with conversion, a picture close to that of measurements in terms of Munsell value and chroma. The instrument was designed to show graphically on a two-dimensional scale simultaneous values for reflectance and yellowness. Further, the instrument is self-contained in a moveable cabinet about table height, with a minimum of exposed parts. The exposure of samples and reading of results is done in the horizontal plane of the table. Electrical measurements of photocell currents are reportedly converted to color as in the Color-Difference Meter, except that Brown Electronik amplifiers replace the galvanometer, and reversible motors, responding to the signals from these amplifiers, replace the human operator, both in standardizing the instrument and in turning dials to obtain color settings. While this particular instrument is limited to the range of cotton colors, the principles upon which it is designed are adaptable to other limited ranges of color, in either two or three dimensions, it is stated.

* Mfg. by Gardner Laboratory, Bethesda, Maryland.

• New Celanese Bulk Terminal

The opening of new bulk terminal facilities at Carteret, New Jersey for the distribution of methanol has been announced by the chemical division of Celanese Corporation of America. Methanol is produced at the company's plant at Bishop, Texas, and shipped by tanker from nearby Corpus Christi to the New Jersey terminal from which point it is distributed in tank trucks, tank cars and drums to industrial consumers in the Middle Atlantic and New England states.

This is the second in a series of tanker movements of industrial organic chemicals to large markets in the northeast, by Celanese Corporation of America. In 1948 the company pioneered in the water transportation of bulk formaldehyde from Corpus Christi to New Haven, Connecticut.

• Gordon Research Conferences

The Gordon Research Conference, sponsored by the AAAS, formerly known as the Gibson Island Research Conferences, for 1950, will be held from June 26 to September 1 at the Colby Junior College, New London, New Hampshire. The facilities of the College have been made available for the Conferences.

The conferences were established to stimulate research in universities, research foundations and industrial laboratories. This purpose is achieved by an informal type of meeting consisting of the scheduled lectures and free discussion groups.

The first meeting of each Conference is held Monday morning at 9 o'clock, Eastern Daylight Saving Time. The morning sessions, through Friday, are scheduled from 9:00 A.M. to 12:00 Noon. The second session of each day is held in the evening from 7:30 to 10:00 P.M., Monday through Thursday. There are no Friday evening meetings.

Individuals interested in attending the Conference are requested to send in their applications to the Director, immediately. Each applicant must state the institution or company with which he is connected and the type of work on which he is most interested. Attendance at each Conference is limited to 100.

Requests for attendance at the Conferences, or for any additional information, should be addressed to W. George Parks, Director, Department of Chemistry, Rhode Island State College, Kingston, Rhode Island. From June 20 to September 1, 1950, mail should be addressed to Colby Junior College, New London, New Hampshire.

Earl E. Berkley is Chairman of the Textiles Group. Joseph H. Brant is Vice Chairman.

The following subjects are slated for the Textiles Group:

JULY 17—B. B. Robinson, "Production and Utilization Problems of Long Vegetable Fibers" and J. B. Goldberg, "The Interpretation and Practical Application of Textile Research."

JULY 18—W. J. Hamburger, "New Scientific and Psychological Methods Applied to the Evaluation of Complex Textile Properties" and Games Slayter, "New Developments in Glass Fibers and Their Fields of Industrial Application."

JULY 19—J. A. Howsmon, "The Fine Structure of Cellulose Fibers" and Robert F. Peterson, "Methods of Preparing Casein Fibers and Their Properties."

JULY 20—H. J. White, Jr., "Some Physical Chemical Studies on Dyeing" and G. R. Seidel, "Flame Retarding Cellulosic Materials with Salts of Titanium and Antimony."

JULY 21—B. L. Browning, "Influence of Fiber Characteristics on Paper Making Properties."

JULY 23—8:00 P.M., Public Lecture. Subject and Speaker to be announced.

• Illuminator and Viewer

The Universal Illuminator and Viewer, a new accessory for use with the basic Color-Eye color measuring equipment, is now available from Instrument Develop-

IDL Illuminator and Viewer

ment Laboratories, 163 Highland Avenue, Needham Heights 94, Mass. The attachment simulates in a controlled manner the hand action of the human color matcher in orienting samples relative to source and angle of viewing. It reportedly permits complete goniometric studies of all types of colored industrial materials to determine the effects of angles of illumination and viewing on apparent color and is said to be suited to simple use with any external source of illumination as well as the internal source provided. For measurement of materials such as textured or pile fabrics, spinning of samples may be combined with angular adjustments, it is stated. When combined with the computing photoelectric system of Color-Eye, which simulates the eye and brain of the observer, the completed instrument is reported to provide a most realistic simulation of the human observer plus numerical evaluation of color difference. In common with all Color-Eye designs, equipment is suitable for continuous production use as well as laboratory investigation, the manufacturer states.

Complete information may be had by writing direct.

• Bjorksten New York Office

Dr. Johan Bjorksten, President of the Bjorksten Research Laboratories, Inc., has announced that the Bjorksten Research Laboratories have established an office in New York City, at 50 East 41st Street.

The opening of this new office has been occasioned by the expansion of the firm, and will enable it better to serve its clients in industry throughout the country, it is stated.

The Chicago office of Bjorksten Research Laboratories will continue operations under the direction of Dr. Edwin L. Gustus, Vice President. Dr. Johan Bjorksten will divide his time between the New York office and the research laboratories of the corporation in Madison, Wisconsin.

The Bjorksten Research Laboratories specializes in technical development work for industry on a contract basis.

• Morton Changes Corporate Name

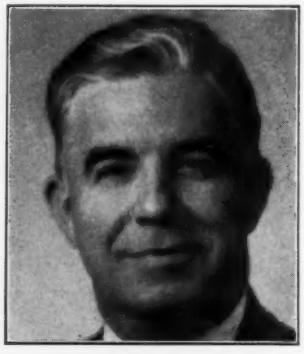
Announcement has been made in Greensboro, N. C. by Joseph R. Morton, President of Morton Chemical Company, of a change in corporate name to Morton-Withers Chemical Company. Coincident with the change in name, the company has increased its capital stock and working capital to add $100,000.00 to its resources, it is reported. The change in name has been occasioned by the addition to the organization of John P. Withers as Vice President and Secretary. In this capacity

John P. Withers

Mr. Withers will give especial attention to production and research.

Mr. Withers was born in Raleigh, N. C., where for many years his father, Dr. W. A. Withers, was head of the Department of Chemistry at N. C. State College. He received his A. B. in Chemistry in 1936 at the University of North Carolina and his Masters degree in Chemical Engineering at M. I. T. in '38. Since that time he has served twelve years with Standard Oil Company in both the Petroleum and Chemical Divisions, the first few years with Standard Oil Development Company, where he was involved with Engineering and Production Research. During the war years he served as a Coordinator on the Aviation Gasoline and Synthetic Rubber Chemicals program, with Petroleum Administration for War. Following his return to Standard Oil he served in the management coordination end of the Chemical Products Division.

The predecessor company, Morton Chemical Company, has a background of nineteen years in the production of textile auxiliaries, including a wide range of products such as wetting, rewetting and dispersing agents, synthetic detergents, finishes, coatings and the like.



Joseph R. Morton

Joseph R. Morton, the founder of the company, will continue as President and Treasurer and will devote his efforts to general management and sales promotion. The company is currently installing a new steam plant and a water cooling system. Offices are at the plant at 2110 High Point Road, Greensboro, N. C.

• Addition to Stein-Davies Long Island Plant

Lawrence Gussman, Vice President of Stein, Hall & Company, Inc., has announced the award of a contract to the Turner Construction Company for the erection of an addition to the plant of its subsidiary, the Stein-Davies Company, in Long Island City for the manufacture of adhesives, textile and paper sizings and industrial food products.

The project involves a 5-story and basement building, 90 by 100 feet, with laboratory facilities on the fifth floor. Alexander D. Crosett is the engineer. Work will commence immediately and the project is scheduled for completion next October.

• Jones Named Technical Sales Assistant

E. Langford Jones, formerly chief chemist at the Virginia Cellulose plant of Hercules Powder Company in Hopewell, Va., has been named technical assistant in sales for the Virginia Cellulose Department in Wilmington, Del.

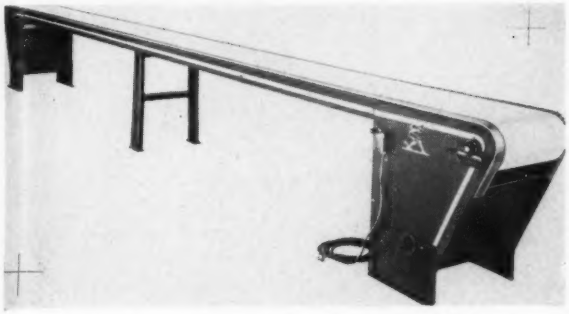
Leon L. Bertram, supervisor of the development group at the Hopewell plant, succeeds Mr. Jones as chief chemist.

A graduate of William and Mary College, Mr. Jones joined Hercules in 1939 as a chemist at the Virginia Cellulose plant in Hopewell. He was named operating supervisor in 1946, and chief chemist in 1948 where he supervised development of new techniques in preparation and use of chemical cotton manufactured by the Virginia Cellulose Department of the company.

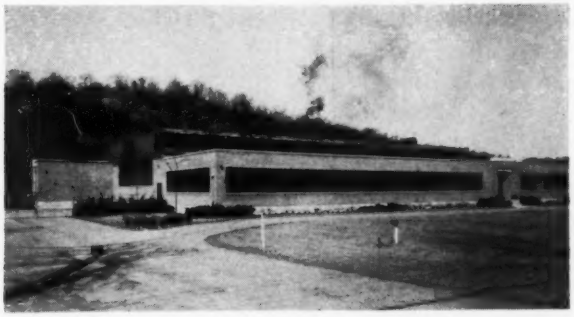
Mr. Bertram, a graduate of Pennsylvania State College, joined Hercules in 1941 as a chemist at the company's Experiment Station in Wilimington, Del. A month later, he was transferred to the laboratory of the Virginia Cellulose plant in Hopewell. He was named development supervisor there in 1946. He is a member of the American Chemical Society.

• Sheppard Appointed Assistant Director

Herbert H. Hatch, Director of Hatch Textile Research, testing laboratory, 25 East 26th Street, New York, N. Y., announces the appointment of John W. Sheppard as Assistant Director. Mr. Sheppard has been with the organization two years. Adolph Marklin recently marked his Twentieth Anniversary with the laboratory as technician.



Mar-Rail "Flo-Table"



Alexander Smith & Sons New Products Development Center

• "Flo-Table" Belt Conveyor

Assembling from stock parts and units to mill owners' specifications is said to cut cost of the new "Flo-Table" Stock Model Belt Conveyor, an economical means of freeing high cost labor for productive assignments in the mill. A product of Mar-Rail Conveyor Co., 560 York Ave., Pawtucket, R. I., it can be installed for either horizontal or floor-to-floor conveying. Among its uses the company cites the following: transports empty bobbins to Bobbins Cleaner; makes possible continuous inspection of bobbins before cleaning; carries cleaned bobbins away to storage bins; automatically carries cloth from Folder to packing and shipping departments; conveys baskets of Tops and packages from dye house or dyeing operation; transports Roving Bobbins from Roving Frames to Spinning Frames; and is an economical and efficient means for transporting materials between other similar operations. Important features include interchangeability of Beds. (Slide, Roller, Line Roll, or troughing types are available for standard models). New Bed types can be inserted at any time to handle a different material in the event of a production change, it is stated. Standard belt widths from 6" to 36" in 2" multiples and standard lengths to over 100 feet (10 to 100 lbs. capacity per foot depending on model) are available from stock. "Flo-Table" can be floor mounted at 18" to 37" height, or ceiling suspended. All units are precision made of smooth pressed steel, and drive and takeup are safely enclosed in housing, the company states. Accessories are also available from stock. Complete data and prices may be obtained upon request.

• New Du Pont Dyestuffs

The Du Pont Company's Dyestuffs Division recently has put on the market five new products. The manufaturer's descriptions follow.

"Celanthrene" Fast Pink 3B—a direct dyeing acetate color which is suitable for the production of a wide range of pastel shades of pink, lilac, and lavender as well as for shading. The color has high affinity for both acetate rayon and nylon and has excellent leveling and penetrating characteristics. It is suitable for materials that are used for sportswear, dress goods, and bathing suits that must withstand light and laundering.

"Acetamine" Fast Yellow 4RL—One of the notable characteristics of this new addition to the range of Du Pont dyes for acetate and nylon is its exceptionally good fastness to light. This color discharges well, is a valuable shading element for increasing the light fastness in various acetate color combinations, and is recommended for the coloring of drapery fabrics, upholstery materials, furniture coverings, sportswear and dress goods.

"Pontamine" Diazo Scarlet P Conc.—The brilliant scarlet shades produced by this product can be discharged to a good white on both viscose-process rayon and cotton. It possesses general good fastness characteristics and is suitable for dyeing materials used for dress goods, sportswear, play clothing and similar fabrics.

"Pontamine" Fast Blue BLL—a direct dyeing medium blue especially recommended where an unusual degree of resistance to light is required. It can be applied to all forms of cotton and viscose-process rayon by the usual methods. It is suitable for dyeing upholstery and drapery fabrics and is also of particular interest in the production of taupes and grays for automotive materials.

Du Pont Anthraquinone Blue 4GL—The addition of Du Pont Anthraquinone Blue 4GL to the range of acid dyes for wool offers the processor a greenish shade of blue that possesses generally good all-round fastness characteristics. It is used for dyeing women's wear materials, blankets, knitting yarns and is also suitable for dyeing nylon.

• McCarty Joins C. A. & E.

G. S. McCarthy, Jr. has joined the technical-sales staff of The Carolina Aniline & Extract Company. Mr. McCarty recently was graduated with a B.S. Degree in Chemistry from the University of California.

• New Alexander Smith Pilot Plant

Alexander Smith & Sons Carpet Company has announced that it has contracted for the purchase of a modern factory building in Ardsley, New York, to house the expanding product development and pilot plant activities of the Company's Research and Development Division.

The Smith Company reportedly was to have taken title on the building around April first from the Indiana Steel Products Company, for which the building was constructed in 1946. The work of moving existing pilot plant facilities from the Yonkers mill and the installation of additional equipment is expected to be accomplished by fall.

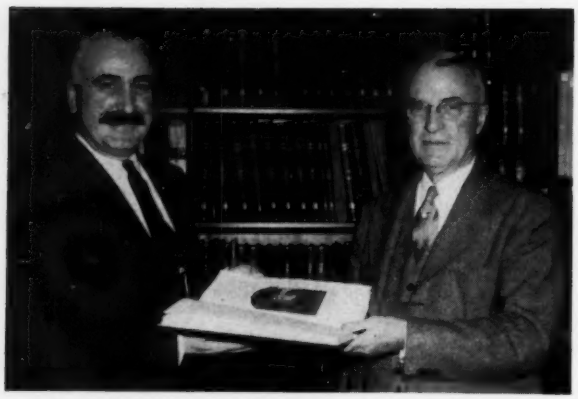
According to A. Griffin Ashcroft, Smith's Director of Research, the new building, which is located four miles north of the Company's mill at Yonkers, New York, is ideally suited to pilot plant and product development work. Comprising 23,000 square feet of floor space, the single story brick building contains facilities for production and office operations. It is located on 11½ landscaped acres between the Saw Mill River Parkway and Saw Mill River Road, to which the plant's truck loading dock and parking spaces have access.

In addition to pilot plant operations, the building will be used for chemical products research, which will be conducted for the mutual benefit of Alexander Smith and its wholly-owned subsidiary, Sloane-Blabon Corporation, manufacturer of hard-surface floor coverings.

• Stein, Hall Movements

Stein, Hall & Company, Inc. announce the removal of their Providence Office on March 20th to the Industrial Trust Building, 111 Westminster Street, Providence, R. I. They will retain the same telephone number, Jackson 1-6360.

The Textile Laboratory has also been moved and will be established in their factory at 753 School Street, Pawtucket, R. I., where the company states that more and better facilities for serving the textile industry are available.



Derek Spence, left, Making Presentation to Dr. Benjamin T. Brooks

Frank Greenwall (Standing) and Obbe Meijer

• Spence Presentation to Chemists' Club

Derek Spence, managing director of Peter Spence & Sons, Ltd., British Chemical Manufacturer, has presented a copy of the 350-page volume, "The Earliest Chemical Industry", to Dr. Benjamin T. Brooks, chemical consultant and chairman of the library committee of The Chemists' Club, 52 East 41st Street, New York, N. Y., for inclusion in the Chemists' Club Library.

"The Earliest Chemical Industry" is a model of the art of book production as practised in England. It is issued in a limited edition of 1,100 numbered copies. The book is published in commemoration of the centennial, November, 1946, of Peter Spence & Sons Ltd., English chemical manufacturers. It took six years to prepare, but appearance was delayed because of post-war paper shortages and other technical difficulties.

"The Earliest Chemical Industry", which sells for $50.00 a copy, is available through C. Tennant, Sons & Co., of New York, 100 Park Avenue, New York 17, New York. Tennant is the sole United States representative for Peter Spence & Sons, Ltd.

• Ripley Honored by ACS

Philip F. Ripley of Andover, Mass., former chief chemist of the American Woolen Company, was honored by the nation's chemists and chemical engineers at the 117th national meeting of the American Chemical Society in Philadelphia on April 10.

A diploma certifying fifty years' loyal support of the Society and its activities was presented to Mr. Ripley by Dr. Ernest H. Volwiler, executive vice-president of Abbott Laboratories, North Chicago, Ill., and president of the Society, at a general assembly in the Bellevue-Stratford Hotel.

Mr. Ripley is one of eight chemists and chemical engineers to be honored this spring as fifty-year members of the Society. They come from six different states, Washington, D. C., and Ontario, Canada.

Born in 1876, Mr. Ripley obtained the bachelor's degree at Yale University and continued his studies at the Massachusetts Institute of Technology and at the University of Heidelberg in Germany. He then started work as a chemist for the American Woolen Company, eventually becoming chief chemist, a position he held until he retired in 1930 as a result of serious illness.

A member of the Society of Chemical Industry, Mr. Ripley has also been active in civic affairs in Andover.

• Wool Research to be Reviewed

Programs on wool being conducted in the Regional Research Laboratories of the Bureau of Agricultural and Industrial Chemistry, U. S. Department of Agriculture, will be reviewed at a meeting arranged by The Wool Bureau, Inc., for May 4 at the Hotel Statler, New York.

Among the papers to be presented are:

"The Wool Scouring Program at the Western Regional Research Laboratory"—Dr. Harold P. Lundgren.

"Wool Grease Products Research"—Dr. J. T. Scanlan, Eastern Regional Research Laboratory, Wyndmoor, Pa., and

"The Investigation of Chemical Modifications of Wool at the Western Regional Research Laboratory"—Dr. Harold P. Lundgren.

Giles E. Hopkins, technical director of the Bureau, will preside at the meeting, set for 2:30 P.M. in the Keystone Room, Hotel Statler, New York, May 4. Ample time will be allowed for discussion.

Representatives of the woolen and worsted industry who are interested in attending the meeting are requested to write to Mr. Hopkins, at 16 West 46th Street, New York 19, N. Y.

• Greenwall Visits European Affiliates

Frank Greenwall, President of National Starch Products Inc., recently visited with Obbe Meijer, director of Nationale Zetmeelindustrie, N. V., Veendam, Holland and followed with a visit to National Adhesives Limited, Slough, England. Both are affiliates of National.

Nationale Zetmeelindustrie produces all types of potato starch and dextrine products as well as adhesives and synthetic resins, principally for export.

• Scholarship to Utica Textile Students

S. Stroock & Company, Inc., has announced the award of a scholarship for 1950-51 in Textile Technology at the State Institute of Applied Arts and Sciences, a division of the State University of New York located in Utica. S. Stroock & Company whose plant is in Newburgh, New York, has also aided in establishing specialized training programs in textile manufacture in local high schools. They are a leading producer of luxurious specialty fabrics woven of rare fibers from the vicuna, the llama, the Kashmir goat and the camel.

Application for scholarships will be open to all employees of S. Stroock & Company and their families. It will amount to $1350 for the complete two-year program at the Institute. The candidate will be chosen by a selected scholarship committee.

• Two Named to Stein, Hall Board

Morris S. Rosenthal, President of Stein, Hall & Company, Inc., has announced that at the Annual Stockholders' Meeting of the company on March 14th, the entire Board of Directors of the company was re-elected. In addition, William W. Strasser, Jr. and Leslie A. Jacobson were elected to the Board.

● ASTM Symposium

A Symposium on "The Dimensional Stability and Shrink-proofing of Textiles" with three formal papers as the basis of discussion, a luncheon in honor of the retiring Committee Chairman, Professor H. J. Ball, and the award of the Harold DeWitt Smith Memorial Medal, featured the three-day series of meetings of A.S.T.M. Committee D-13 on Textile Materials, March 15 to 17 inclusive, at the Park Sheraton Hotel, New York City. Organized in 1914, A.S.T.M. Committee D-13 on Textile Materials has made many contributions in its work involving standardization and research.

Professor Ball, Professor of Textile Engineering, Lowell Textile Institute, Lowell, Mass., has been Chairman since 1930. He is retiring from this office this year. The luncheon was held on Wednesday, March 15, honoring his 20 years of service.

A Past President of the Society, Professor Ball has served A.S.T.M. and other technical and scientific organizations in other capacities. As a testimonial to the esteem of his associates and many friends in Committee D-13 Professor Ball was presented with an appropriate Scroll and a gift by Dr. Frederic Bonnet, American Viscose Corporation. Preceding the presentation of the scroll, Giles E. Hopkins, Technical Director of the Wool Bureau, New York, addressed the gathering describing some of the outstanding services rendered by Professor Ball to D-13 and to the Society.

W. H. Whitcomb was Toastmaster and Chairman at the luncheon. Mr. Whitcomb has served the committee as secretary for the past 20 years and prior to that served a term as chairman.

On March 16, the first award of the Harold DeWitt Smith Memorial Medal was presented to Dr. Herbert F. Schiefer, Physicist at the National Bureau of Standards. At the ceremony honoring Dr. Schiefer, Richard T. Kropf, Vice President and Director of Research, Belding Heminway Co., addressed the gathering on "The Medalist—The Man." W. D. Appel, Chief, Textiles Section, National Bureau of Standards, spoke on "The Medalist—The Scientist." Presentation of the Citation and Medal was made by Professor Ball. This medal has been made possible through the generosity of the Fabric Research Laboratories in Boston and is to be given annually, or at longer intervals, by Committee D-13 as a testimonial to the memory of Dr. Harold DeWitt Smith. It is to be given for outstanding achievement in, or contribution to, the science of the utilization of textile fibers and structures, or methods for the evaluation of their properties.

Immediately following the Medal Award Ceremony a Symposium was held which included the presentation of the following technical papers by outstanding authorities:

"The Dimensional Stability and Shrinkproofing of Cottons"—E. C. Pfeffer, Cluett Peabody, Troy, N. Y.

"The Dimensional Stability and Shrinkproofing of Woolens"—W. von Bergen and Claude Clutz, Forstmann Woolen Mills.

"The Dimensional Stability and Shrinkproofing of Rayons"—J. A. Woodruff, American Viscose Corporation.

● Textile Open House Planned

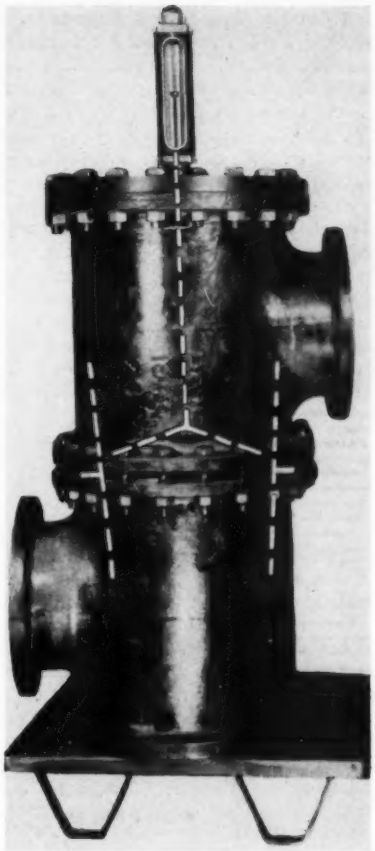
The students of the School of Textiles at North Carolina State College will hold a Textile Open House on Saturday, April 22, 1950. All persons interested in textiles or in the School of Textiles are invited to attend the day-long affair.

The Textile Open House is a student-sponsored and student operated project. Guided tours showing the processing of cotton, rayon, and wool will be conducted at intervals throughout the day. Special displays will demonstrate unusual aspects of the textile industry. Movies will be shown in the new Auditorium and each guest will receive a souvenir.

The Textile Open House is being held so that those in industry will be able to see the college training that their prospective employees receive, and so that other interested persons will be able to see how their clothing and household textile items are produced.

For purposes of coordination the School of Textiles has been broken into seven working departments: (1) Yarn Manufacturing (opening through roving), (2) Yarn Manufacturing (spinning through packaging) and Synthetic Processing, (3) Weaving, (4) Knitting, (5) Dyeing, (6) Wool Processing, and (7) Textile Testing. The volunteer student workers have elected leaders who will be responsible for the organization of the various departments. A prize will be awarded to the Department which, in the opinion of the judging committee, has best carried out its part of the project.

The coordination of the Textile Open House rests with a Steering Committee composed of: William M. Barnhardt, President of Tompkins Textile Society; Reynolds A. Carnevale, President of the State College Chapter of A.A.T.C.C.; Harry M. Dalton, President of Phi Psi; J. Allison Devant, Vice-President of Phi Psi; Sanford Gluck, representative from the Greater University Student Council; David E. King, President of Delta Kappa Phi; and Richard H. Norrell, President of Sigma Tau Sigma. The organizations represented by the members of the Steering Committee are actively assisting in sponsoring this event.



Ratosleeve Basic Elements

● Plant-wide Flow Measurement

Three basic units in standard pipe tees plus indicating, controlling, recording or telemetering instruments of the Fischer & Porter Company, 83 County Line Rd., Hatboro, Pa. provide plant-wide flow measurement. Flow rates from 2 to 6200 gpm and from 3 to 12,500 cfm are reportedly handled with a minimum number of basic metering parts designed for installation inside standard pipe fittings. Mountings for indicators, controllers, recorders, integrators and telemetering instruments are interchangeable in all sizes.

Suitable for liquids, gases, pulps and slurries, the Ratosleeve meters are said to permit plant-wide flow-measurement standardization at low cost. They are described and illustrated in catalog 83, copies of which can be obtained by writing Fischer & Porter Company.

● South Florida Test Service Expands

The South Florida Test Service, 4201 N. W. 7th St., Miami, Florida has announced the acquisition of an additional city block for the expansion of their in-

land proving grounds and plans for the erection of a new $25,000 laboratory building. Construction is to start early this summer. The company will celebrate its 20th anniversary in 1951.

South Florida Test Service specializes in weathering, corrosion and sunlight tests utilizing the unique climatological conditions found only in subtropical southeastern Florida, but has laboratory facilities for many types of special research and test work. The company is serving concerns in the United States and Canada and some foreign countries testing all kinds of materials and products for durability and permanency by actual exposure to atmospheric and sunlight attack direct and under glass.

The company reportedly was awarded two government contracts recently for testing various materials for the Quartermaster Corps.

South Florida Test Service maintains a complete weather station at their inland proving grounds as well as complete solar radiation recording instrumentation.

The company now maintains three locations in South Florida in addition to the main inland test field and laboratory in Miami. These locations at Miami Beach are for salt atmospheric tests and marine tests such as tidewater and total immersion in the ocean. A warehouse is also maintained in Miami for storage tests on packaging of foods, metal parts, etc.

• Tennessee Eastman Doubles Lodi Warehouse Capacity

Tennessee Eastman Corporation announces that it has doubled the capacity of its warehouse and distribution center at Lodi, New Jersey, to stock a number of Eastman industrial chemicals which have heretofore been available only from its plant in Kingsport, Tennessee.

Among those chemicals immediately available from Lodi are the Eastman plasticizers, including the new low-color dioctyl phthalate, meta- and para-aminophenol, and BON. In addition, the Lodi center carries a complete line of Eastman acetate dyestuffs and has a fully equipped dyestuff laboratory to service dyers in the Eastern states.

• Dievers Joins PTI Staff

Director Bertrand W. Hayward of the Philadelphia Textile Institute announced that John C. Dievers has joined the faculty as instructor in Knitting.

Mr. Dievers, a graduate of Girard College and the Philadelphia Textile Institute, has varied industrial experience as a full-fashioned hosiery knitter and as a mechanical assistant with Boger and Crawford.

Coleman Model 9 Nepho-Colorimeter

• Nepho-Colorimeter

Coleman Instruments, Inc., Maywood, Illinois, has announced its new Coleman Model 9 Nepho-Colorimeter, a multipurpose instrument designed to operate accurately and effectively within the related field of Filter Colorimetry, Turbidimetry and Nephelometry.

For Colorimetry it acts as a precision colorimeter with a balanced filter-selection, accepting a wide range of cuvette sizes. Readings may be had by direct-deflection of the taut-suspension galvanometer or by calibrated potentiometer with null indication.

For Nephelometry it acts as a sensitive instrument for the measurement and evaluation of joint haze in liquids by dispersed (Tyndall) light. It is reported useful where suspensions are too dilute to measure accurately by transmitted light. Combined with Coleman Permanent Nephelos Standards, the instrument permits reproducible measurement of haze and its expression in numerical terms, the company states.

• U. S. Testing Representative to Visit Pakistan

L. Shaffi, Consul General of Pakistan, and A. L. Brassell, president of the United States Testing Company, Inc., have announced the first technological mission to Pakistan to study the installation of neutral testing laboratory facilities in Pakistan.

H. M. Block, vice president of U. S. Testing will leave on March 17 for Parkistan, arriving in that country on March 21. Mr. Block will be there for approximately three weeks, making his headquarters at Karachi. While there he will meet with Dr. Nazir Ahmad, S. M. Huda, Dr. S. A. Husain, A. Khaleeli, Mr. Habibullah and other Pakistan government officials, to make arrangements for the establishment of a laboratory.

The Pakistan government has recognized the need for standards and specifications and the quality control of commodities exported, it is stated. These include cotton, wool, jute, hides and skins, crude drugs, metals and ores. Mr. Shaffi, Consul General of Pakistan, is said to have explored with the Testing Company executives the possibility of the Testing Company making this study, with the view of establishing a neutral laboratory in Karachi.

Pakistan's Prime Minister, Mr. Liaquat Ali Khan, will be arriving in the United States as a state guest of President Truman on May 3. He will be accompanied by Begum Liaquat Ali Kahn.

• Bolton Elected NATMM President

J. Hugh Bolton, President of the Whitin Machine Works, Whitinsville, Mass., has been elected President of the National Association of Textile Machinery Manufacturers, it was announced recently. Other officers elected at the same time include Vice-President—Frederic W. Howe, Jr., Vice-President and General Sales Manager of the Crompton and Knowles Loom Works, Worcester, Mass.; Treasurer—Samuel F. Rockwell, President and Treasurer of the Davis and Furber Machine Company, North Andover, Mass.; Secretary—Max F. Thompson of the Whitin Machine Works.

The Association is sponsoring the 1950 American Textile Machinery Exhibition in Atlantic City, N. J., Auditorium May 8 through 12.

Mr. Bolton has reported that the 1950 Exhibition will be 32% larger in floor space covered than the recent similar showing in Manchester, England, and that it will be the largest display of textile machinery developments ever shown anywhere.

• Admiral Blandy Speaks at DCAT Dinner

2200 representatives of the drug, chemical and related industries from all parts of the country attending the 24th Annual Dinner of the Drug, Chemical & Allied Trades Section of the New York Board of Trade (DCAT) at the Waldorf-Astoria Thursday evening, March 9th, heard Admiral Wm. H. P. Blandy, U. S. N. (Ret.) discuss his views of the future.

Admiral Blandy who recently retired from the U. S. Navy is now President of the Health Information Foundation, newly created by the drug, pharmaceutical, chemical and allied industries to assist Americans in obtaining the health facilities they need without financial hardship.

Harold C. Green, Chairman of the DCAT, presided. C. P. Walker, Jr. was in charge of dinner arrangements. Seated on the dais were officers of leading national associations in the drug, chemical and related industries.

Photo by Fabian Bachrach

Lester C. Conner

• Conner to Head Bryant Research

Bryant Chemical Corporation of North Quincy, Massachusetts, is expanding its research and development division and has taken space in Hingham, Mass., for the establishment of a modern research laboratory.

Lester C. Conner, formerly Chief Chemist for Masury-Young Co., Boston, Mass., is to be the Director of Research. Mr. Conner is a graduate of M.I.T. and has had ten years' experience with Masury-Young Co. on textile oils, wax dispersions and soaps. For ten years previous he was Research Chemical Engineer with Pacific Mills, Lawrence, Mass.

• U.S.I. Trade Fair Opens New York Office

The First United States International Trade Fair has opened an office in the Warwick Hotel in New York City, according to announcement made by I. S. Anoff, president of the Fair.

The office is located on the lobby floor of the Warwick Hotel, 65 W. 54th Street, Telephone: CIrcle 7-2700, Extension 39.

The First United States International Trade Fair will reportedly present a market place for producers from all over the world to exhibit their merchandise before thousands of buyers.

Goods representing the entire range of consumer products and industrial equipment will be presented in nearly a million square feet of exhibition space during the Fair, which will be held in the four largest exhibition buildings in Chicago: the Navy Pier, the International Amphitheatre, the Coliseum and the Chicago Arena.

Products will include raw materials; semi-processed merchandise; high-production mass-produced articles; exclusive luxury merchandise, industrial machinery, equipment, and supplies; and chemicals.

Contracts received at the headquarters office of the Fair in the Merchandise Mart in Chicago represent firms from 28 different nations and the United States while negotiations now in progress are said to indicate that products from more than 40 different countries will be on display when the Fair opens next August.

Foreign offices of the Fair have been established in Zurich, London and Paris.

Registration fee for buyers has been set at $5.00, which includes the International Trade Fair catalog, reservation and hotel accommodation service, badge, credentials, and entry to all buildings of the fair as many times as desired.

• E.C.P.D. Approves Textile Enginering Curriculum

The Engineers' Council for Professional Development, the official accrediting agency of the engineering profession, has accredited for the first time a curriculum in textile engineering, according to its recently issued annual report for 1949.

The first textile engineering course to receive this official seal of approval is offered by the A. French Textile School of the Georgia Institute of Technology, Atlanta, Ga. Bachelor-of-science and master-of-science degrees in textile engineering are granted upon completion of the undergraduate and graduate parts of the curriculum.

• Ward New Evans Research Assistant

Evans Research & Development Corporation has announced that William W. Ward recently joined their corporation as research assistant. Mr. Ward is a graduate of Fordham University. Prior to attending Fordham he served 51 months in the United States Army in the 8th Air Force.

• Warwick Appoints Green

Ernest Nathan, president of Warwick Chemical Company, division of Sun Chemical Corporation, has announced the appointment of William A. Green to technical sales service work in the southern New England territory. Mr. Green will specialize in the sale of Suntone Pigment Printing Colors.

William A. Green

Photo by Fabian Bachrach

Harry B. McClure

• McClure Honored

At the annual banquet of the Commercial Chemical Development Association, Harry B. McClure, division vice-president of Carbide & Carbon Chemicals Division, Union Carbide & Carbon Corp. was the first recipient of an honor award scroll.

Mr. McClure has been in the field for over nineteen years and is responsible for the introduction of approximately 200 synthetic organic chemicals on a commercial basis. The award was presented on the basis of his contributions to chemical development.

The award committee was made up of the following: Gordon Cragwell, Charles Pfizer & Co.; C. D. Goodale, Commercial Solvents Corp. (association president); Lauren B. Hitchcock, National Dairy Research Laboratories; and V. E. Wellman, American Cyanamid Co.

• Safety Directory

"Best's Safety Directory for 1950-1951," covering the entire field of safety, fire protection and control, hygiene, first-aid and sanitation, is now available, according to an announcement of Alfred M. Best Company's Safety Engineering Division.

The 511-page Directory is said to combine the best practical features of a safety manual, directory, index, encyclopedia and catalog. Its indexing, subject-grouping system, and illustrations facilitate easy location of safety products.

Price—$5.00 with lower rate for quantities. Obtainable from the home office of Alfred M. Best Company, 75 Fulton Street, New York 7, or branch offices in Atlanta, Boston, Chattanooga, Chicago, Cincinnati, Dallas and Los Angeles.

• Water Softener Bulletin

A bulletin on most recent developments in hot-process water softeners is now available from Graver Water Conditioning Co., division of Graver Tank & Mfg. Co. Inc., 216 W. 14th St., New York 11, N. Y.

Twelve different methods of treating water to eliminate impurities, reasons for the popularity of the hot-process method and its advantages, and the chemistry of hot-process water softening are covered.

The two basic designs and the operation of Graver Hot Process Softeners are described, together with six adaptations of each design to various plant conditions. Methods of supplementary hot phosphate treatment are also explained. Sections of the bulletin are devoted to the latest advances in methods and designs of chemical feeders, and also filters and hot process softener accessories.

The bulletin contains over 30 diagrams of hot process designs and flow charts, together with photographs of Graver installations of various sizes and types of units. Copies of the bulletin can be obtained by addressing Dept. 182, 216 West 14th Street, New York 11, N. Y., and asking for Bulletin WC 102.

• Calco Technical Bulletin 809

A paper "Studies on Wool Dyeing: Effect of Metals on Tippy Dyeing" by Henry E. Millson, American Cyanamid Company, Calco Chemical Division, Bound Brook, N. J., has been made available to the textile industry, as Calco Technical Bulletin No. 809.

The paper has been presented at meetings of the Mid-West and Philadelphia Sections of the A.A.T.C.C. The study is concerned chiefly with the effect of metals on the deposition and distribution of dye within the individual fibers. The distribution of trace metals in the fiber has been determined by cross sections and other microscopical studies. It observes that the presence of metals in the dye bath is an important factor in two of the major dyeing difficulties — tippy dyeing and undesirable color changes during the dyeing procedure.

A copy can be obtained by writing the Advertising Department, American Cyanamid Company.

• OTS Releases 19 German Technical Papers

"Developments in the Wear Resistance of Textiles," a collection of 19 papers on this and related subjects published in Germany during the war years, is now available to the American public through the Office of Technical Services of the U. S. Department of Commerce.

The collection, a clothbound volume of 353 pages, was compiled at the request of the Chief Quartermaster, U. S. Army European Command, to summarize significant German researches on fiber behavior.

During the war Germany gave considerable attention to the serviceability of textile materials. Cut off from peacetime imports, the Germans were forced to use synthetic materials of lower general serviceability than their customary natural fibers. They were also interested in minimizing the load of their limited industrial capacity by making textiles last longer. As a result, a great deal of study was undertaken in the field of fabric serviceability. The papers reported in this volume include a number of the more significant articles on the subject.

Most of the papers translated and reproduced in this volume appeared in *Melliand Textilberichte*, between 1939 and 1947, but hitherto unpublished manuscripts are also included. Papers are well illustrated, and accompanied by comprehensive tables and charts.

Five main topics are covered: Evaluation of the serviceability and wear resistance of textiles; chemical and photochemical degradation of cellulose; investigation and classification of textile fiber properties; fiber structure and reactability of fibers; and resistance to water and shrinkage.

A complete author index is included.

PB-99296, "Developments in the Wear Resistance of Textiles and Related Papers Published in Germany during World War II," sells for $5 per copy. Orders should be addressed to the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C., accompanied by check or money order payable to the Treasurer of the United States.

• Monsanto Bulletin Available

Two nonionic type surface active agents designed principally for industrial use are described in detail in a new bulletin available from Monsanto Chemical Company.

They are Sterox No. 5 and Sterox No. 6, both polyoxyethylene thioethers. Both are reported to be compatible with anionic and cationic type detergents and effective in hard water or in the presence of metallic salts.

The bulletin includes data on chemical and physical properties, solubility and surface tension. Suggested applications in textile and metal cleaning operations are given.

• "The Chemistry of Guanidine"

American Cyanamid Company announces the publication of Volume IV in the series "Cyanamid's Nitrogen Chemicals Digest." The new bulletin is entitled "The Chemistry of Guanidine" and covers the chemical and physical properties of this compound, the synthesis of guanidine, methods of analysis, toxicity, and potential application in a number of fields.

Copies of the publication may be obtained upon written request to the Advertising Department, Industrial Chemicals Division, American Cyanamid Company, 30 Rockefeller Plaza, New York 20, New York.

• Asphalt Mastic Flooring

Acid resisting waterproof, slipproof and long-wearing qualities of Rulon Asphalt Mastic Floors are presented in a new illustrated catalog, which contains full information and specifications. Write Ralph V. Rulon, Inc., 3900 N. 2nd Street, Philadelphia 40, Pa.

• DCAT Plans "Ol' Timers' Nite"

DCAT "Ol' Timers' Nite" is scheduled for May 10th, at the Hotel Astor (Belvedere Roof), according to plans now under consideration by the Section Activities Committee, headed by Charles P. Walker, Jr.

• Stauffer Chemical To Build New Plant

Stauffer Chemical Company has announced the construction of a new $1,000,000 plant at Lowland, Tennessee. The plant is expected to be completed late this year, and will produce carbon bisulphide which is used as an essential reagent in the manufacture of cellulose xanthate leading to viscose rayon and cellophane.

• ACCCE To Meet April 25

Association of Consulting Chemists & Chemical Engineers, Inc. will hold a dinner meeting on Tuesday, April 25, 1950, 5:00 P.M., at the Shelburne Hotel, 37th St. and Lexington Ave., New York City, Skyline Room, in the form of a symposium on "Professional Chemical Services by Consulting Associates and Individual Consultants." Speakers will be Dr. Robert S. Aries of R. S. Aries and Associates, Brooklyn, and Charles Davidoff, New York City.

• Armour Bulletin Available

Armour & Company, 1355 West 31st St., Chicago 9, Ill. in their booklet "Ethomeens, Ethomids, Ethofats" describe the characteristics, properties and reactions of ployethelene glycol derivatives of fatty amines, fatty amides and fatty acids. It also goes into their known and indicated uses and suggests formulas for many specific applications. Numerous charts supplement the descriptive material.

Booklets are free upon request.

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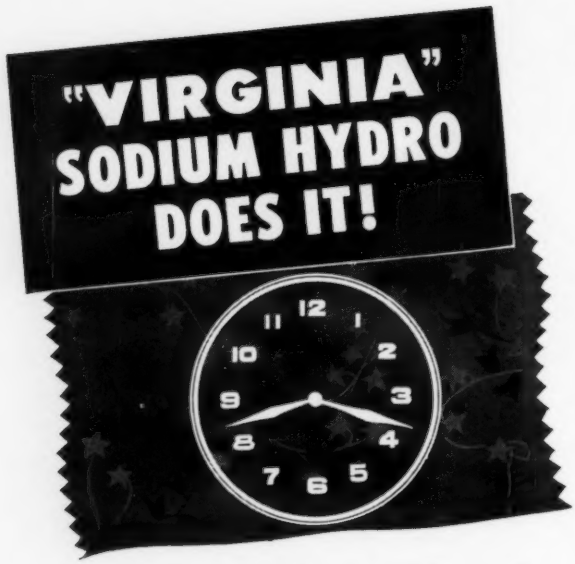

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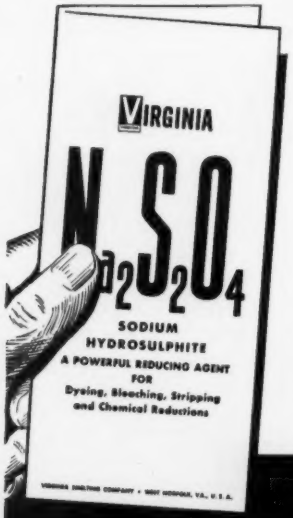

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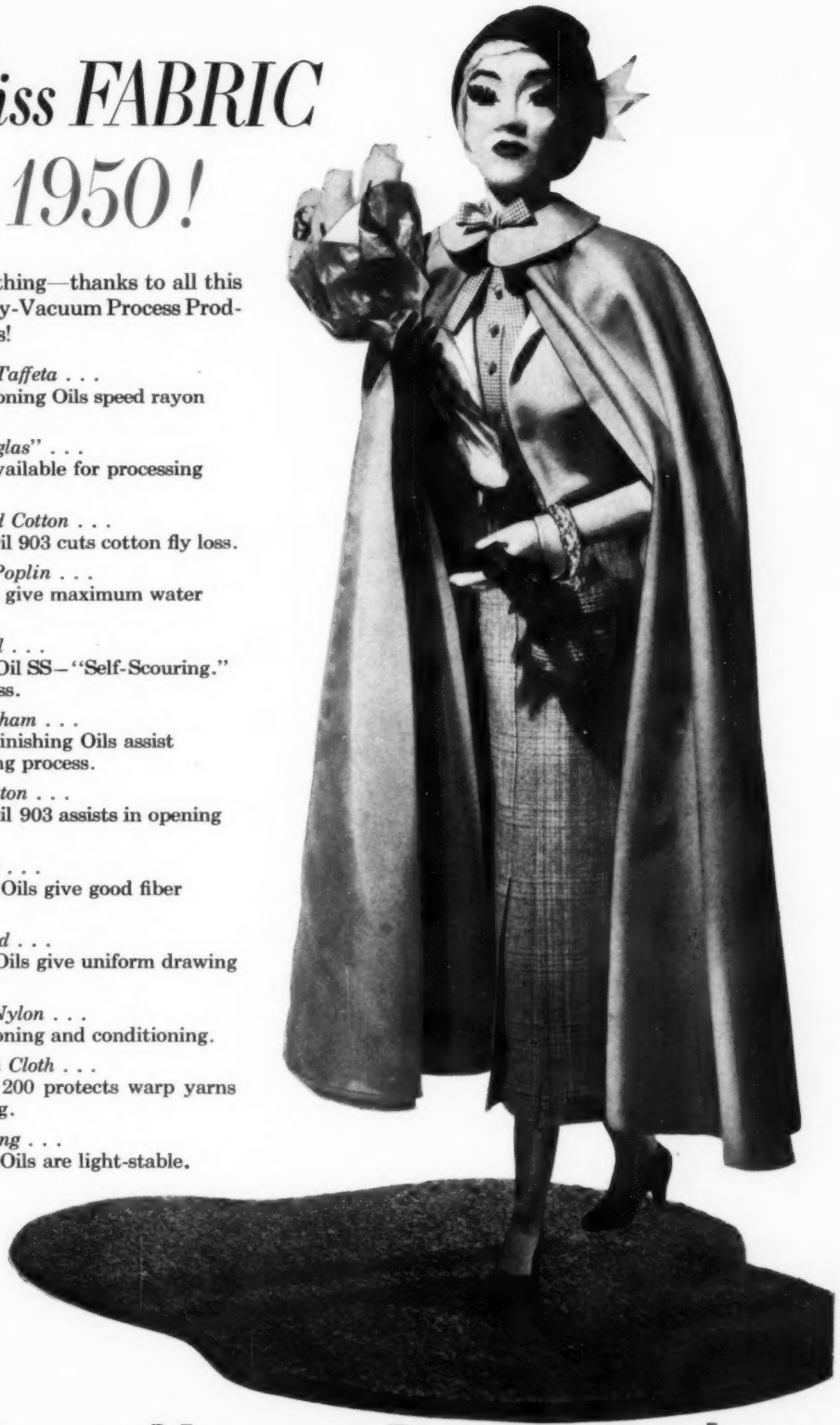

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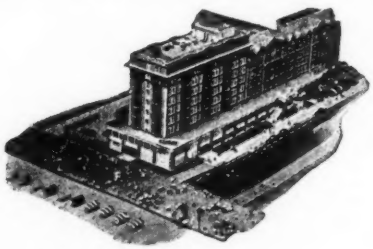

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The other new electrode assembly features convenience and stability where a flow-type unit must be used. Made of plastic, it is light, small, easy to install and thoroughly dependable. Where plastic might not suit, we of course continue to supply assemblies of cast iron and/or Pyrex brand glass.

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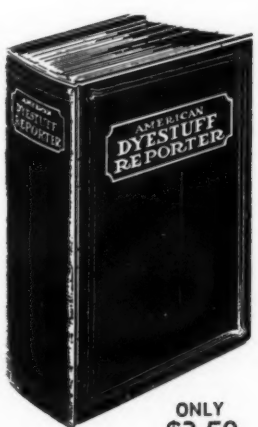

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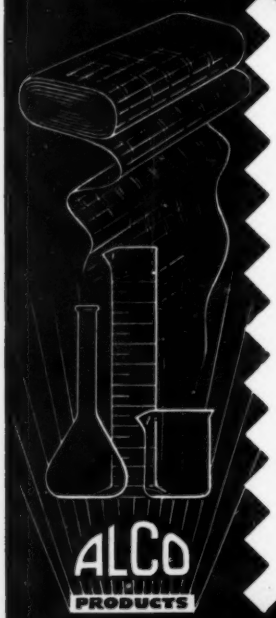

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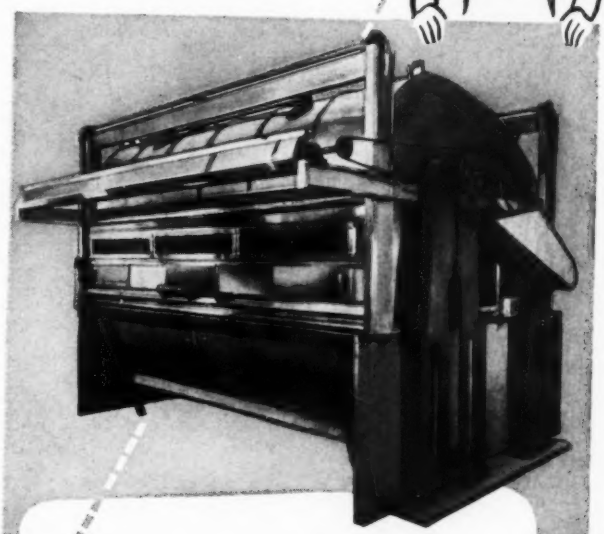

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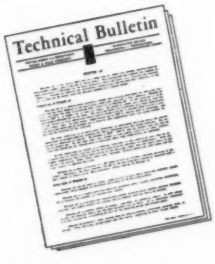

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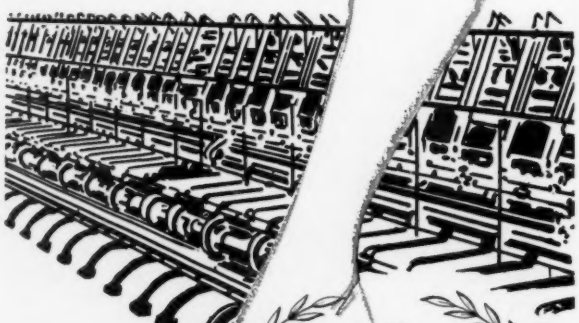

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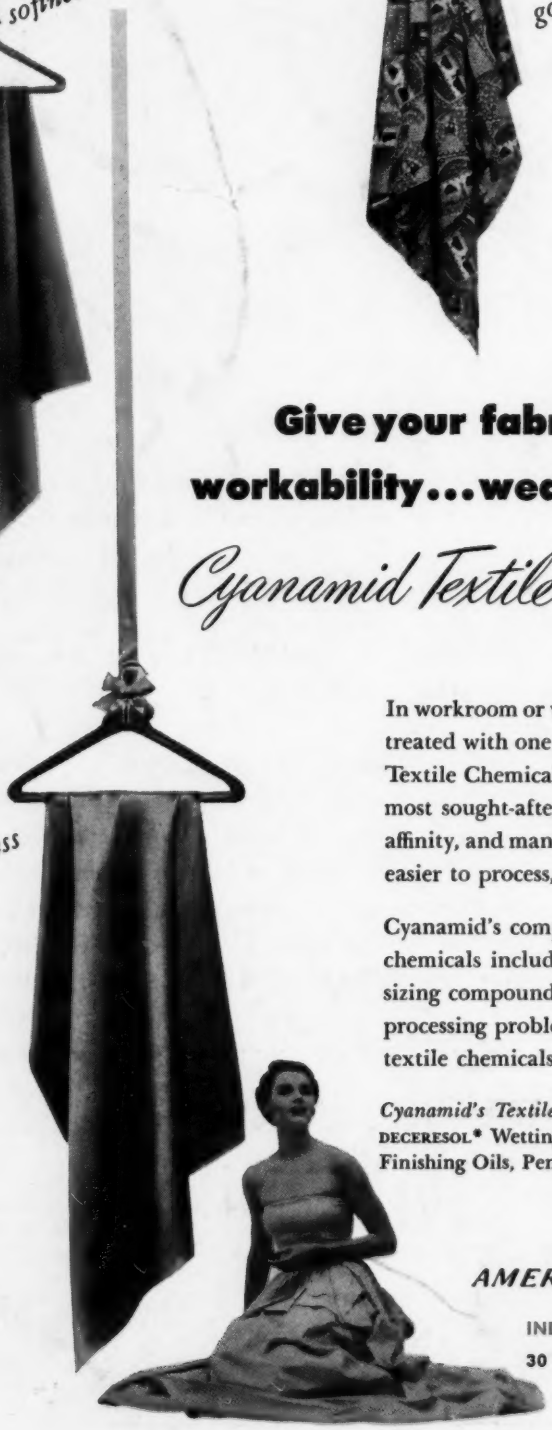

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